Access to livelihood opportunities through MyCiTi BRT in Cape Town, South Africa

Master Thesis – Sustainable Development Programme

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Word Count: 18965

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EFL STICHTING

Abstract

Bus-Rapid Transit systems are considered a promising tool to connect residents of urban peripheral areas with livelihood opportunities. However, there is a lack of qualitative insight into effects of BRT systems on accessibility, especially in the spatial context of low-density African cities. Therefore, this research aimed to examine the transport needs of residents in Khayelitsha, a socio-economic deprived area in Cape Town where a BRT system called 'MyCiTi' became available in 2013. Through a survey and in-depth interviews, it was evaluated whether the new BRT system was able to overcome barriers with regard to transport accessibility, and to what extent that opened up more opportunities. In the survey it was found that MyCiTi scored slightly better than Cape Town's other transport modes on aspects of safety, reliability and comfortability. However, a statistical ANOVA test showed only a significant outcome for the train in comparison to the other modes of transport. Among taxi, Golden Arrow and MyCiTi no significant differences were observed. Thus, the train was considered significantly less accessible than Cape Town's other modes of transport. Furthermore, through the interviews it was found that accessibility is generally unacceptably low for residents of Khayelitsha. Users of all modes of public transport experience severe difficulties while attempting to reach employment and other daily activities as a result of unsafety, long travel times and high travel costs. Mainly due to a challenging geographical layout and social context, the implementation of a BRT system could not contribute to increase livelihood opportunities in this particular case-study. However, it should be recognized that it has an important role in consolidating the existing livelihood opportunities.

Acknowledgements

In this place I would like to express my gratitude for everyone that enabled this research in any way. Firstly, this research was made possible by the EFL Stichting who supported me with the travel costs so that I could visit Cape Town. In Cape Town, Thembi, Ursula, Camille and Renee were of crucial value in undertaking the fieldwork for this research. For the academic support I would like to thank both prof dr. Annelies Zoomers and prof dr. Ajay Bailey for their valuable input and guidance.

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1 INTRODUCTION - TRANSPORT AS A MEANS TO ALLEVIATE POVERTY

Poverty and transport are heavily intertwined. Transport is one of the key prerequisites for securing livelihoods as it is often the only way to access employment, healthcare and education (Jones & Lucas, 2012; Levine, 2013). Consequently, when transport is not available or not affordable, it can have profound effects on people's opportunities to provide a sufficient income.

For the urban poor of the Global South, transport is often inaccessible in multiple ways. Private motorized transport is often out of reach due to the initial purchase costs (Andreasen & Møller-Jensen, 2017). Therefore, most people are fully dependent on public transport of which the costs, relative to people's income, are extremely high. This is further exacerbated by their living situation. The poor of live in areas most removed from jobs or economic hubs as this is where the costs of living are (more) affordable (Lucas, 2018). At the same time, the further out they live, the higher will the costs of transport be. In developing countries many of the urban poor live in informal areas, which are often not served by any means of public transportation (Venter, Vokolkova, & Michalek, 2007). As the informal areas are often deprived of key facilities in education, employment and healthcare this lack of connection to public transport undermines the residents' access to livelihood opportunities.

Consequently, many cities that mean to improve the livelihoods of the urban poor have taken up the strategy to improve access to formal public transport. Especially Bus Rapid Transit (BRT) systems have become a trend of sorts in pro-poor city development (Jones & Lucas, 2012). This method is considered a cost-effective intervention as it does not require an elaborate new infrastructure, since it can be supported by existing roads (Cervero, 2013). Based on this reasoning, also the (City of Cape Town, TDA, 2014) has formed a strategy to connect its socio-economic deprived areas to the economic hubs of the city center through the BRT system dubbed 'MyCiTi'. The first parts of this system started running in the city center around the FiFa Worldcup of 2010.

While there is a strong necessity to provide the residents of the socio-economic poorer areas

of Cape Town with sufficient means of transport, limited knowledge exists as to what their specific needs are in this regard. How transport affects poverty is a complex relation, and various contexts have found various outcomes (Jones & Lucas, 2012). When infrastructure plans are brutally copied and forced on a region, outcomes sometimes can be devastating for existing livelihoods and mobilities, for example in the case when informal transport is pushed out. From previous experiences it has become clear that insight in daily needs is crucial to provide a fitting transport solution, especially for the poorer segments of society (Fouracre, Sohail, & Cavill, 2006). Seemingly obvious, transport can only improve income when the routes actually connect areas that provide economic opportunities, and when they are affordable and safe to use.

Therefore, this research aimed to examine the transport needs of residents in Khayelitsha, a socio-economic deprived area in Cape Town where MyCiTi became available in 2014. By examining the transport needs of different user groups in the area, through a survey and in-depth interviews, it was evaluated whether the new BRT system was able to overcome barriers with regard to transport accessibility, and to what extent that opened up more opportunities.

The main research question of the study is:

How has the implementation of the MyCiTi bus system affected accessibility to livelihood opportunities for residents of Khayelitsha, Cape Town?

The following sub-questions will contribute to answer the main questions:

1. What are the characteristics of the current transport system in Cape Town?
2. How do residents of Khayelitsha perceive the accessibility of the transport system in Cape Town?
3. To what extent was MyCiTi able to overcome barriers to transport accessibility that are present for residents of Khayelitsha?

2 LITERATURE REVIEW & THEORETICAL FRAMEWORK

Bus Rapid Transit (BRT) has gained momentum especially in the last decade. Many cities have followed the famous example of Bogotá's Transmilenio system, which is considered a 'best practice' example among BRT advocates (Wood, 2015). As of today, 170 cities have implemented a similar system, of which five are situated in Africa. Next to three cities in South Africa, also Nigeria and Tanzania have chosen to provide a BRT system. In comparison, 55 cities in Latin America and 43 cities in Asia have implemented a BRT system(BRTData.org,). The BRT has received enthusiastic support in both academics as policy circles mainly because of its relatively low costs, the possibility for rapid implementation and it's perceived high performance and impact (Hidalgo & Gutiérrez, 2013).

BRT characteristics and objectives

Even though the implementation of a best practice would suggest as such, the BRT model does not have one single type or meaning. In fact it spans a spectrum of forms of bus-driven public transportation; everything from improved bus services in mixed traffic to complete segregated systems fall into the category of BRT (Hidalgo & Gutiérrez, 2013). Therefore, the most suitable description of BRT is the one posed by (Levinson, Zimmerman, Clinger, & Gast, 2003) who state that BRT is:

'*A permanently integrated system of facilities, services, and amenities that collectively improve the speed, reliability, and identity of bus transit. In many respects, BRT is rubber-tired light rail transit (LRT), but with greater operating flexibility and potentially lower capital and operating costs.'*

To summarize, BRT is a form of prioritizing bus transit, but shaped to fit the local context and political objectives (Wood, 2015). Often the systems use dedicated bus lanes, pre-payment of fares and upgraded bus stops, which are intended to improve the system's safety and efficiency. It's integration with the larger transport system can vary greatly. Some cities aim to integrate informal transit in their system, others simply run alongside it (Cervero, 2013).

Generally the motivation of cities to implement a BRT system is to improve urban mobility through high speed, reliable public transport as opposed to unregulated private operations that often are the main mode of transport in cities in the Global South (Hidalgo & Gutiérrez, 2013; Kumar, Zimmerman, & Agarwal, 2013). These informal services employ and transport many people and have been found to be crucial in the functioning of many cities, especially for lower-income communities (Oviedo Hernandez & Titheridge, 2016). However, a system based solely on informal providers is also characterized by oversupply on some routes and undersupply on others which does not make it the most efficient option (Kumar et al., 2013). In addition, cities are growing rapidly which increasingly leads to transportation problems and as a result impacts the livability of the cities. To get to a more sufficient and formalized transit system BRT systems have been among the most commonly adopted strategies for such reform (Kumar et al., 2013).

Next to these transport-related objectives, BRT is also part of the larger 'Transit-Oriented Development-trend' where infrastructure projects are used as a broader tool to spur land development, upgrade the urban environment and decrease pollution (Cervero, 2013). Most importantly, BRT projects in the Global South are often advocated for because they have strong pro-poor objectives, and are placed in a larger policy agenda aimed to alleviate poverty through increasing access (Jennings, 2015; Jones & Lucas, 2012). This rhetoric employing pro-poor, accessibility and equity as arguments explains why institutions such as the Worldbank support and finance BRT projects (Wood, 2015).

Findings relating to BRT interventions

Most studies that have researched impacts of BRT are Cost-Benefit Analysis studies with a strong focus on the transport dimensions of the system. When looking at impacts of BRT most studies indeed find positive results. Literature reviews from (Carrigan, King, Velasquez, Raifman, & Duduta, 2013; Cervero, 2013; Kumar et al., 2013; Venter, Jennings, Hidalgo, & Valderrama Pineda, 2018) concluded that the new BRT systems in cities such as Johannesburg, Lagos, Bogota, Ahmedabad and Delhi resulted in travel time savings, reduced congestion, health impacts due to environmental improvements and increased physical activity, improved traffic safety. Generally, (Kumar et al., 2013), 'each system is delivering significant benefits to the citizens of each city in excess of its modest costs and impacts'.

As most BRT projects are implemented with a strong pro-poor motivation, studies relating to impacts of BRT have sought to understand the impacts on lower-income groups mainly through the concepts of accessibility and social equity.

Equity impacts

Equity is most often understood as at least having equality of opportunity for everyone in a society (Levine, 2013; Venter et al., 2018). With regard to equity and increased accessibility (Carrigan et al., 2013; Venter et al., 2018) find that generally the BRT projects have a positive effect on equity. Equity relates in this case to positive results that impact lower income groups more that higher income groups. The main positive impact with regard to equity is travel time savings: lower income groups experienced more savings in travel time as a result of the BRT implementation. Other impacts are found to be positive but not necessarily progressive: with regard to affordability the impact is mixed but most BRT systems do not result in cost savings for its lower income groups. Also increased road safety does not necessarily impact the lower income groups more.

Furthermore, when looking at ridership data (Venter et al., 2018) found that compared to citywide income distributions, medium-income people tend to be overrepresented on most BRT systems. This suggest that even though BRT has positive impacts on its users, it does not succeed to be very progressive when the urban poor do not make use of the system.

Accessibility impacts

Whether BRT can influence accessibility of opportunities depends on accessibility of the BRT system itself, and also whether the BRT connects meaningful destinations. (Venter et al., 2018) found that BRT positively influences resident's ability to access opportunities such as jobs but also schools and shops by enhancing connectivity and decreasing travel times. However, (Venter et al., 2018) note that these findings relate to centralized, dense cities and state that it is less clear how BRT can contribute to enhancing accessibility in African cities where many job opportunities are informal and widely dispersed across space. They state that in these cities that even if spatial accessibility improves through effective feeder strategies, poor passengers may experience overall reduction in accessibility due to fare increases and

longer travel times when transfers between formal and informal modes are required.

Knowledge gap

Even though studies are generally positive, they mostly do not provide in-depth insight in the actual effects the transport system has on the lives of the poor. Most studies are quantitative in nature, resulting in aggregate outcomes for population groups (Ferbrache, 2019). Further, these results mainly focus on the transport-related outcomes such as travel time or costs saved, more variety in travel purposes and number of trips (Combs, 2017) or number of jobs that can now be reached (Scholl, Oviedo, Innao, & Pedraza, 2018). However, these studies have a strong focus on potential, or opportunity, and do not show whether such opportunities indeed translate in improved socio-economic situation for the beneficiaries (Jones & Lucas, 2012). That makes it also more difficult to understand whether any changes should be considered an improvement of the situation. For example, if it is observed that more trips are being made that outcome seems positive. However when it is the result of diminishing job opportunities closer to home it can actually be considered a negative outcome. Moreover, the interaction between personal circumstances and societal circumstances is often overlooked. When travel time is very short, but there are no employment opportunities at the end of the journey, the BRT still has limited effect as a pro-poor development tool. Therefore, authors such as Banister argue that research should look more into suitability of those destinations, what characteristics of different travelers are, or how those travelers experience their trips (Banister, 2019).

As a result, there is a strong need for in-depth qualitative research to study the interactions of outcomes, and how changes in the transport system are experienced by its users. A suitable approach to do so is by employing the concept of mobility-related exclusion, which has gained traction within mobility studies and transport geography over the last two decades. It mainly provides more insight because it aim to get a more holistic overview of factors that influence a person’s socioeconomic status while recognizing the role that mobility plays in this (Lucas, 2012).

2.1 THEORETICAL FRAMEWORK - MOBILITY-RELATED SOCIAL EXCLUSION

The starting point of mobility-related social exclusion is the understanding of deprivation a as the result of a lack of participation in society (Church, Frost, & Sullivan, 2000). Social exclusion in this theory is provided as an alternative to the study of poverty, in order to recognize that poverty is often defined as a lack of income, but that often disadvantaged people face multiple deprivations that go beyond a lack of wealth (Church et al., 2000).

A commonly used definition of the concept of social exclusion is the following by (Levitas et al., 2007), who state that social exclusion can be understood as:

'... the lack or denial of resources, rights, goods and services, and the inability to participate in the normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas. It affects both the quality of life of individuals and the equity and cohesion of society as a whole.'

Lately, more insights have been developed and found that transport, or a lack of mobility can have a severe impact on people's ability to participate in society. Furthermore, the concept of social exclusion recognizes that mobility is only one among many aspect of societal participation, but nevertheless in a society that revolves around high mobility it can be a crucial prerequisite. How mobility, or transport, interacts with social exclusion is illustrated in the following framework by Lucas (2012) who aggregated research that examined this relationship.

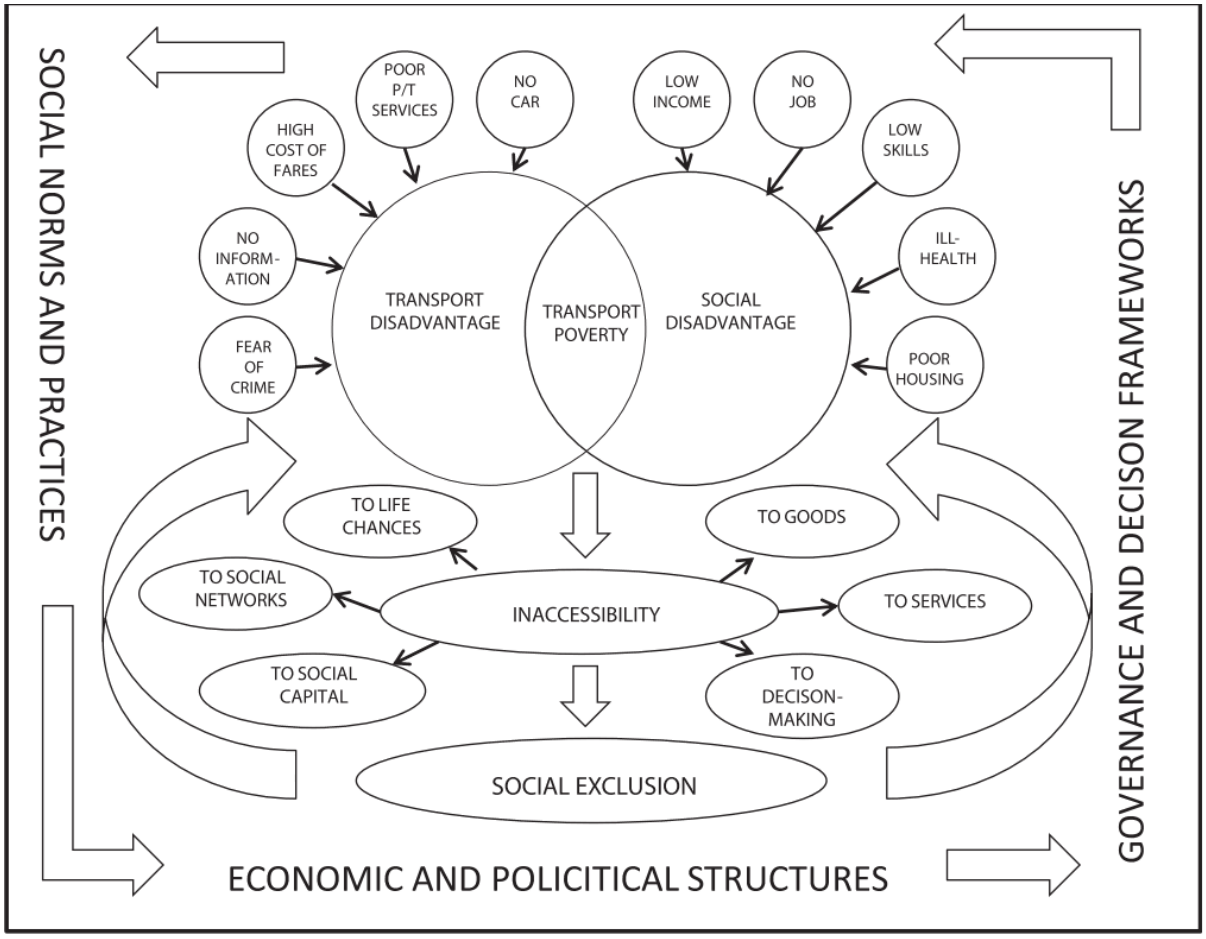

Figure 1 – The conceptual relation between social exclusion, transport and accessibility by Lucas (2012)

The framework illustrates that social exclusion is the result of an inability for the individual to access the various aspects of daily life that can enhance one's well-being. These aspects are all considered important to participate fully in society. Thus the framework does not only incorporate access to goods and services, but also considers social capital, cultural capital and democratic representation.

A lack of access to these aspects can occur when social disadvantage such as a low income or complete absence of a job overlap with further disadvantage regarding transport. Such disadvantages can be high fares, a lack of safety or limited understanding about how to access the transport system. Both the aspects of transport disadvantage and the aspects of individual disadvantage in their own right the potential to hamper one's accessibility to societal participation. However when they overlap with each other an extremely unfortunate

situation can occur which (Lucas, 2012) defines as transport poverty. Also, (Lucas, 2012) shows that social exclusion can further increase the disadvantaged position of the individual completing a spiral of social exclusion.

Furthermore, the framework shows that this process takes place in the institutional context which is defined by the cycle of social norms and practices that result in certain economic and political structures. These structures further influence certain governance and decision frameworks that impact the provision of transport or employment schemes, for example.

Research looking into these specific aspects of transport and its relation to social exclusion frequently use the term *mobility-related exclusion* or *transport-disadvantage*. I have specifically chosen to employ the term 'mobility-related exclusion' as access to opportunities does not always have to be fulfilled through transportation. Especially in developing contexts, many access relies on non-motorized transport, therefore to include all aspects of mobility, mobility-related exclusion is a more suitable term. This is defined by (Kenyon, Lyons, & Rafferty, 2003) as: '[It is] The process by which people are prevented from participating in the economic, political and social life of the community because of reduced accessibility to opportunities, services and social networks, due in whole or in part to insufficient mobility'. Furthermore, they make an important addition to this definition by stating that this occurs in 'a society that is built around the assumption of high mobility'.

Accessibility - meaningful destinations

What should be noted in this definition of (Kenyon et al., 2003) is that they also focus on the access, but with the addition that this is not about just reaching *any* destination, but to destinations that hold opportunities, services and social networks. In an overview on transport and social exclusion studies (Jones & Lucas, 2012) found that accessibility in most studies is defined as 'the degree to which people can reach the goods and services that society considers are necessary for them to live their daily lives'. Under these goods and services is usually understood; employment, education, healthcare and social networks.

Thus, the mobility needs to be directed at meaningful destinations that hold these opportunities for the individual. Therefore, (Levine, 2013) states that it is important to distinguish between the concepts of accessibility and mobility within transport studies. Mobility can be understood as the ease of movement, where accessibility can be understood

as the ease of reaching destinations (Levine, 2013). Therefore, within transport studies usually the concept of accessibility is used to study mobility-related exclusion.

Framework of mobility related exclusion factors

In relation to the study of accessibility, various authors have attempted to create frameworks in which all dimensions of mobility-related exclusion and accessibility can be captured. In the academic literature, the most cited and most adapted one is the framework by (Church et al., 2000), for example by (Benevenuto & Caulfield, 2019; Casas & Delmelle, 2014; Oviedo Hernandez & Titheridge, 2016). However, several others used the frameworks provided by (Cass, Shove, & Urry, 2005; Macdonald & Grieco, 2007; Suhl & Carreno, 2011) The various frameworks have considerable overlap, for example they all mention at least the financial aspect and the time dimension to transport accessibility. However, the framework by Church is the most extensive and takes into account the aspects of accessibility as discussed above. It allows to study both transport accessibility, place accessibility and when conducted qualitatively, it is also possible to find out whether the respondents find the places *accessible to them* as (Ferreira & Batey, 2007) stress. Furthermore, by using a similar framework the comparability of this study is enhanced which can contribute to further scientific understanding of this matter.

Church et al. (2000) distinguished the following seven categories:

Physical exclusion

This factor concerns physical barriers related to the set-up of the transport system and the infrastructure surrounding it. Such barriers can limit use of the system by specifically older people, people with impaired mobility, hearing or vision, but also people who don't speak English or have learning difficulties. Both (Casas & Delmelle, 2014; Oviedo Hernandez & Titheridge, 2016) found in their studies that physical access was mentioned by respondents as an important barrier to use transport. Oviedo found that people with physical limitations were forced into near immobility because of the poor quality of the infrastructure.

Geographical Exclusion

Socially excluded people tend to live more often in peripheral areas, due to lower housing prices and consequently live further away from economic centers (Andreasen & Møller-

Jensen, 2017). Since it is unlikely that someone can carry out all their activities in their direct neighborhood, geographical distance (and resulting reliance on public transport) limits a person's engagement in activities. The studies by (Lucas, 2011) and (Ureta, 2008) also found that due to a lack of facilities in the local area people had to travel far, and were very transport dependent.

Exclusion from facilities

This factor describes the geographical location of the goods and services. (Church et al., 2000) write 'residents in areas with high levels of social exclusion often lack access to good shopping, financial, leisure, health and education because of the time and income constraints in the use of transport services and the flight of some of these facilities from problem areas.' These changes, however, can often mean that the monetary and temporal costs of travel increase. Thus, both the geographical and facilities factor result in higher costs and longer travel time, but due to differing processes.

Economic Exclusion

Socially excluded people can be strongly income constrained, and therefore the costs of travelling can exclude them from accessing the transport network. Consequently, the geographical extent that person can reach for job search, or to travel to work, is limited. This was found important in all studies reviewed. Specifically (Adeel, Yeh, & Zhang, 2016; Lucas, 2011) mentioned that the travel costs relative to the households' income were a heavy burden. (Adeel et al., 2016) found that transport expenditure amounted up to a quarter of the household's budget. The costs were also mentioned as the first major concern by the respondents.

Time-based exclusion

This factor relates to constraints on time that socially deprived people face. Various studies have found that this factor is particularly strong for women whose household activities restrict time available for travelling (Adeel et al., 2016; Alberts, Pfeffer, & Baud, 2016). Also, the amount of time spend travelling is highlighted by (Lucas, 2011) who states that the long travel times (and working hours) resulted in very limited possibilities for people to undertake other life-supporting activities.

Fear-based exclusion

Fear for crime strongly influences how public spaces and transport facilities are used (Church et al., 2000). Socially deprived neighborhoods are more often prone to experience crime, and this can strongly inhibit peoples' access to transport or public places (Oviedo Hernandez & Titheridge, 2016). However, how crime and fear influence people's activity pattern also depends on social characteristics, and especially gender (Church et al., 2000). In all reviewed studies people feared for their personal safety. Especially robberies or assault resulted in different travel strategies or avoidance of trips (Delmelle & Casas, 2012; Lucas, van Wee, & Maat, 2016; Oviedo Hernandez & Titheridge, 2016; Ureta, 2008).

Space exclusion

Security and space management strategies often discourage certain socially excluded individuals from using public and quasi-public transport spaces (Church et al., 2000). Interestingly, this factor is not often discussed in the present literature.

Thus when transport aspects such as travel time and costs decrease it can have various effects on transport related exclusion: most obviously it mediates the economic and time-based exclusion, but it can also overcome the factors of geographical or facility exclusion. The findings of Church also show the importance to differentiate for gender as certain aspects inhibit women more (mainly, time, fear and space). Furthermore, (Church et al., 2000) note that the factors are clearly interrelated. They state: 'For example, a loss of local facilities will generate a need for travel to alternative facilities which may in turn require a problematic reorganization of household commitments leading to time-based exclusion.'

Experience and perceptions

Even though the framework by Church is fairly extensive, based on other studies on mobility-related exclusion, it became clear that one main aspect of mobility is not captured well by Church's framework. The travel experience, comfortability is mentioned by respondents in for example (Casas & Delmelle, 2014) as an important barrier for the use of the transport system. In the case of (Casas & Delmelle, 2014) this refers to behavior by others, such as rudeness of drivers, but in (Adeel et al., 2016) overcrowding was mentioned as most important barrier after costs and availability. It is important to take this into account as it might influence the experience of the other barriers. This is mentioned by (Ureta, 2008) who

state: ‘distance is not only perceived in terms of geographical space crossed, but also depends on the mode and duration of the journey and the convenience of travelling.’

This perception not only matters with regard to the travel experience influences the destinations people go to. How perception influences access to destinations is theorizes more extensively by (Ferreira & Batey, 2007). To illustrate this point they cite Quinn (1984 p 164): ‘individuals will not cite accessibility problems as a constraint to job search if they are unaware of job opportunities located in areas of the city they don’t even consider’. Additionally, even if people are aware of potential sites to visit, they should evaluate those places as accessible *to them*. This is certainly not always the case. Either individuals impose themselves certain access to places based on for example, their beliefs, ethnic background, economic capacity, gender or age, or access can be hampered by institutional barriers (Ferreira & Batey, 2007). Therefore, it is important to recognize the influence of experience and perception in the study of accessibility.

2.2 CONCEPTUAL MODEL

The following conceptual model visualizes how the various aspects of accessibility can result in outcomes of social exclusion.

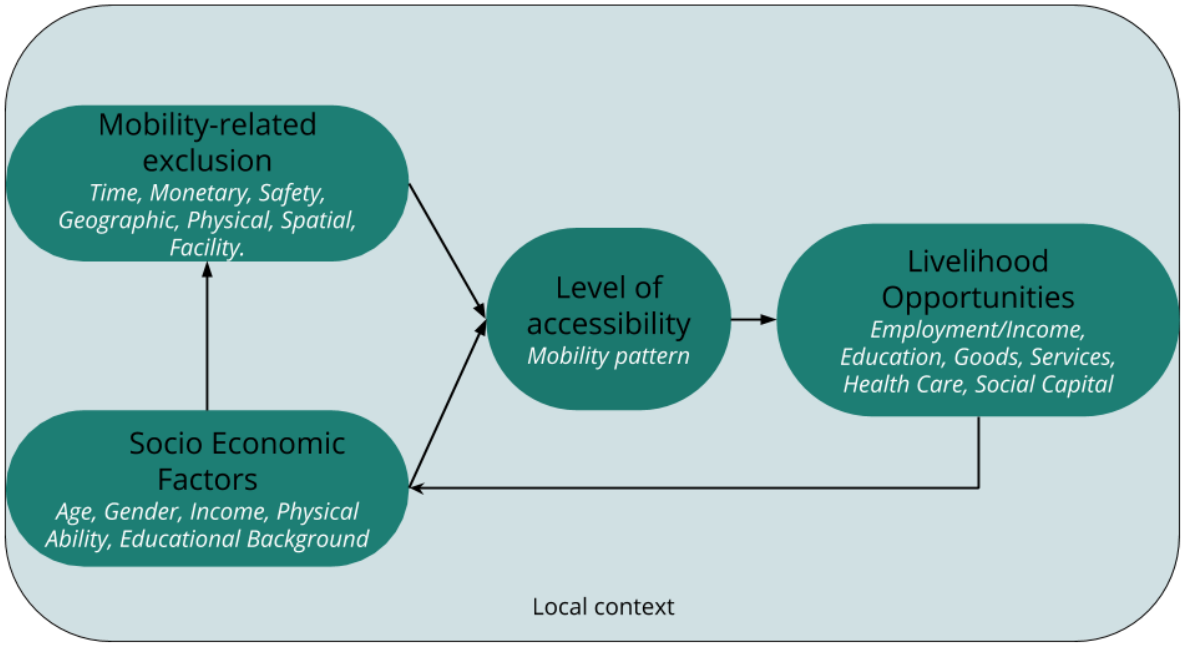

Figure 2 Conceptual Model - Interactions Accessibility & Mobility-related Exclusion (author's own)

Firstly, key in this model is the interaction between transport/locational factors and socio-economic factors. Firstly, socio-economic factors assert influence on the transport factors, as it defines an individual's housing and employment options but also whether a person can understand the system, for example.

Secondly, the model shows that socio-economic factors combined with transport factors as defined by (Church et al., 2000) lead to a certain level of accessibility for that particular individual. For example two people with exactly the same socio-economic background can still have deviating levels of accessibility due to the transport situation of their area. This works also the other way around: for two people living in the same area and thus having the

same transport options, accessibility can differ under the influence of socio-economic factors. For example, men usually experience travel more easy than women, which influences their perceptions of the options they have (Adeel et al., 2016; Alberts et al., 2016). This level of accessibility consequently defines what livelihood opportunities are available to the individual. These opportunities then relate back to the socio- economic factors as it influences someone's income, but also, for example, health status or educational background. All this takes place within the local context. That defines the transport system, the spatial layout of a place and the institutional or economic situation which all define as well what opportunities eventually are available.

Thus, when placing the concept of BRT within the concept of social exclusion, it can be stated that the key objective of BRT should be to overcome these factors of transport disadvantage, in order for residents to be able to fully participate in society and through this to enhance their wellbeing or quality of life.

3 METHODOLOGY

The data of this research was obtained through various sources. Firstly, several trips for observations were undertaken. Secondly, semi-structured interviews were conducted and lastly a survey was carried out to supplement and quantify findings of the interviews. This chapter details how each method was carried out.

Research team

The research was carried out as an individual project, however some of the data was collected in collaboration with three other students from the same master programme. Everyone had her own focus area, however for all of the studies it was important to get information on transport and people's experience with it. Therefore, interviews were sometimes conducted in collaboration. Similarly, the survey was executed jointly. This enabled us to gather richer data in a short period of time. Next to sharing the data this also was desirable for our personal safety, we could travel together.

Nevertheless, the majority of the data for this research was gathered by myself, and mainly data on specifics about transport with regard to costs, length, reason to choose a certain transport were supplemented by the data of the other interviews. The characterization of respondents in table XX shows which data was obtained by whom.

3.1 FIELD OBSERVATIONS

In order to better understand the local context, observational trips with all modes were undertaken from Cape Town to Khayelitsha and back. This mainly served an exploratory purpose as upon arrival the local context was largely unfamiliar. During the trips with the various modes observational notes were taken about the experience, but also operations of the various modes, number of passengers, costs paid et cetera were assessed. Where appropriate some indicative photos were taken. The observational travelling mainly helped improve the quality of the interviews, as I got to know the local context in much more detail. For example, I was more familiar with locations respondents referred to, and the distance from the house. This information aided with probing during interviews. For example I observed that with all the means of transport during rush hour long ques develop. However, this was often not included in the travel time reported by participants, and thus would have

been missed had the observations not been conducted. In addition, the observations trips aided with the recruitment of participants as it enabled to contact other travelers and explain the research on the trips.

3.2 SEMI-STRUCTURED INTERVIEWS

Procedure and sample

The data for both the interviews and the survey was conducted between March and May 2019. Participants for the semi-structured interviews were selected in various ways. Firstly, as mentioned above participants travelling with various modes were invited at major transport hubs. Secondly, various community organizations within Khayelitsha were contacted to help set up contacts with local residents that were possibly more difficult to find at the transport hubs. Eventually one main organization that worked with elderly helped with setting up interviews in Khayelitsha. Respondents were selected randomly, the only criterion for selection was to obtain a variety of modes to get perspectives for all means of transport available in Khayelitsha. However, the influence of the societal organizations should be noted as they were the one to provide us with contacts. Therefore also active recruitment through personal contacts at various modes of transports and locations was carried out to avoid a strong influence or bias based on the societal organization.

The process of the interviews

Upon invitation the aim of the interview was introduced to the potential participants, and a participant information sheet was handed out (see appendix). After consent of the participant the interviews were recorded for analytical purposes, and anonymity was guaranteed. Therefore, all participants were given an unique code to which they will be referred in the further chapters.

An interview guide (added in appendix) was set up with major themes that were to be discussed with all participants. The conversations were semi-structured interviews because certain themes were to be discussed in each interview. However there was not a set order to enable a more natural flow of conversation and to follow the initiative of the participant to raise certain issues.

The interviews were conducted mainly in English. However, some respondents made clear they preferred to respond in Xhosa, the main first language in Khayelitsha. Therefore, during most interviews a translator from the community organization was present to translate when needed. A benefit of this situation was that respondents could answer in the language they felt most comfortable in.

The interviews took place at several locations, depending on the availability of the respondent. Upon invitation it was made clear that the interview could take place in Khayelitsha, but also at a café in the city center or during a respondent's break at work. Which option was chosen depended on the respondent's preference and availability. Thus, some interviews were conducted at respondents' homes, and some in a public space. When in a public space, a quiet area was chosen to be able to speak privately and to enhance confidentiality. In some cases, multiple respondents were available at the same time and the interviews then took more the shape of a focus group. This type of interviewing was not preferred, but in some instances respondents did not have time to wait to go one by one, and therefore were interviewed together. However, it was then the aim to still consider each person's opinions individually, and in the analysis every respondent is coded individually. The interviews had a duration between half an hour and an hour.

Analysis of the interview data

All interviews were recorded and afterwards transcribed verbatim, and as mentioned above, a file was created per person. For the analysis a code book was created based on both inductive and deductive coding. The inductive codes are mainly the general themes that relate to the overarching themes of the research that were found in the literature. Deductive codes were based on themes that emerged during the coding, for example specific locations or context-related problems that participants often mentioned. As the coding scheme in appendix D shows a high detail of coding was employed. This enabled to both yield results for the overarching themes, but also to retrieve information for a very specific topic (e.g. how many MyCiTi users referred to traffic as problem), if necessary. During the process of coding, the codes were reviewed to create broader themes. In-depth analysis of themes was conducted using the analytical software NVivo. Further specifics on certain results are detailed in the chapter that discuss those outcomes.

3.3 SURVEY METHODOLOGY

Procedure and Sample

The data was collected over various weekdays during the peak hours which roughly spanned from 15.00 to 18.00 o'clock. Users of public transport were approached at various transport hubs in the Cape Town central business district. Specifically, participants were approached at the MyCiTi Civic Centre station, the Golden Arrow main bus terminus, the main taxi rank and the central train station in Cape Town. During peak hours the waiting lines at all transport hubs were quite long, which allowed us to approach people waiting in line to take transport to Khayelitsha. The researchers approached people in the ques, explained the purpose of the research and asked for participation. When the public transport users consented to participate, the questionnaire was read out to them. This ensured all questions were answered in a comprehensive manner. The total sample consists of 105 participants, including 51 women and 53 men. This offered us a convenience sample. Due to the capacity of the project, a truly random sample could not be achieved, especially as possible participants left at once upon arrival of the public transport. Consequently, the sample might not be fully representative for the population of the various modes. Still, we aimed to get a varied sample, by approaching both men and women from various ages, enabling us to get an unbiased sample in regard to gender and age.

Material

The survey aimed to assess people's opinions about various aspects of the transport they were using: how long they travelled, whether they consider public transport affordable, safe, comfortable, reliable and sufficiently available. All statements were answered on a 5-point Likert scale, where for each variable the value 1 corresponds with disagree, and 5 with strongly agree. The complete survey can be found in Appendix A.

4 CONTEXTUAL FRAMEWORK

Cape Town, South Africa

The city of Cape Town is a medium-sized city, with 4 million inhabitants in 2016 (City of Cape Town, 2016). The city lies at the south-western tip of the African continent, bordering both the Atlantic and Indian ocean. Figure 3 illustrates the geographical area of the complete region of Cape Town, Khayelitsha's location and the current layout of the MyCiTi routes through the city. The spatial layout of the city is strongly influenced by policies from South Africa's Apartheid history, which until 1994 actively enforced racial segregation (Seekings, 2013). During the Apartheid time, new residential areas for South Africa's non-white citizens were established at the outskirts of the cities. As a result of this policy, the study area of this research was established in 1983 and named Khayelitsha, meaning 'new home' in isiXhosa (Seekings, 2013). Since its establishment, the area attracted large growth until today, with mainly migrants from Eastern Cape settling in what is often termed the 'township'. However, this immigration has currently slowed down, and most younger residents of Khayelitsha were born in the area itself (Seekings, 2013). Recent information estimates Khayelitsha's number of inhabitants around 400.000, of which roughly half of the households live in formal housing, and the other half in informal housing, often referred to as 'shacks'. Image 1 and 2 illustrate how formal and informal housing exists close to each other in Khayelitsha, where the informal areas are more dense than the formal areas.

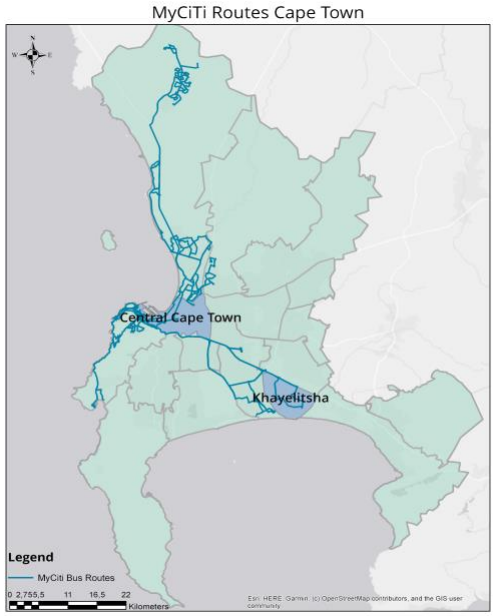

Figure 3 Cape Town's administrative boundaries, MyCiti routes within them

Figure 4 Aerial Photos of Khayelitsha (Source (Miller, 2016)

The socio-economic context

The socio-economic context of Cape Town is highly unequal. The city currently has a GINI-index of 0.58, even though it should be mentioned that it did decrease from 0.67 in 2011 (City of Cape Town, 2016). In the city as a whole, 25.9% of the population lives below Cape Town's poverty line of 3500 rand per month. Even twenty-five years after the end of the Apartheid regime, poverty is still strongly racially influenced. When looking at different population groups, it shows that in the city overall 42% of black households, 23% of coloured households and only 2.9% of white households live below the poverty line (City of Cape Town, 2016). Furthermore, these different groups still live in strongly segregated communities, which creates a spatially unequal city as well.

With regard to Khayelitsha, it can be described as a largely low-income community, as figure 5 shows. More than half of the population falls below the poverty line.

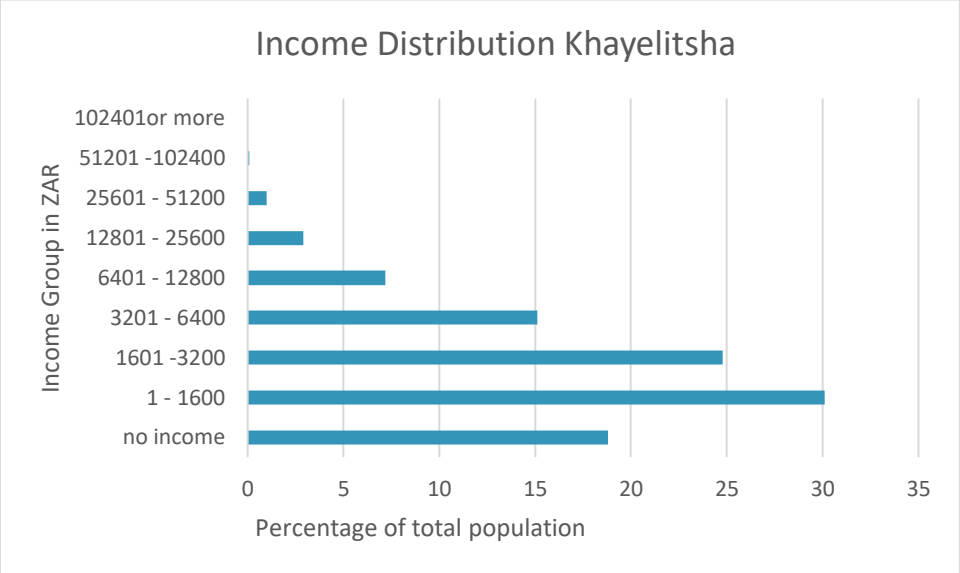

Figure 5 Income Distribution Khayelitsha. Source: (City of Cape Town, 2013)

It should be noted that the 'no income' category is highly unlikely, as poor household receive social grants or participate in informal activities. However, generally households tend to underestimate their income in census studies, which can explain this category. Nevertheless, this is the case for all areas of the city, and it is clear that Khayelitsha as a community is much less affluent in comparison to Cape Town as a whole (Seekings, 2013). This is the result of widespread unemployment, which is also higher in Khayelitsha than in the rest of the city. In

Khayelitsha the unemployment level was 31% , while for the city as a whole it was XX(City of Cape Town, 2013). Furthermore, many residents of Khayelitsha have not received higher education and struggle to find well-paid jobs. The ones that did receive further education do find better paid jobs, resulting in some variation in the area between those with skills and those without (Seekings, 2013).

Furthermore, many low-income households in Cape Town rely on incomes from informal-sector activities. Without the informal sector income, the poverty rate in the city is 25 %, but with the informal-sector incomes factored in, the poverty rate is reduced to 20.6 %(City of Cape Town, 2016). To place the informal sector in perspective, it would be Cape Town's fifth biggest sector if it were considered an official sector, just below manufacturing and even above construction(City of Cape Town, 2016). Jobs that are available within Khayelitsha are mainly related to the public services that are located in the area: the hospital, police, and retail from the mall (Seekings 2013).

Cape Town is characterized by a strong mismatch between residential areas and areas that offer employment opportunities. This is illustrated in figure 6. This is a clear example of the geographical exclusion as described by Church et al. 2000. Most residents of Cape Town live in the South East, where Khayelitsha is also located, however most employment opportunities are in the Northern areas of the city.

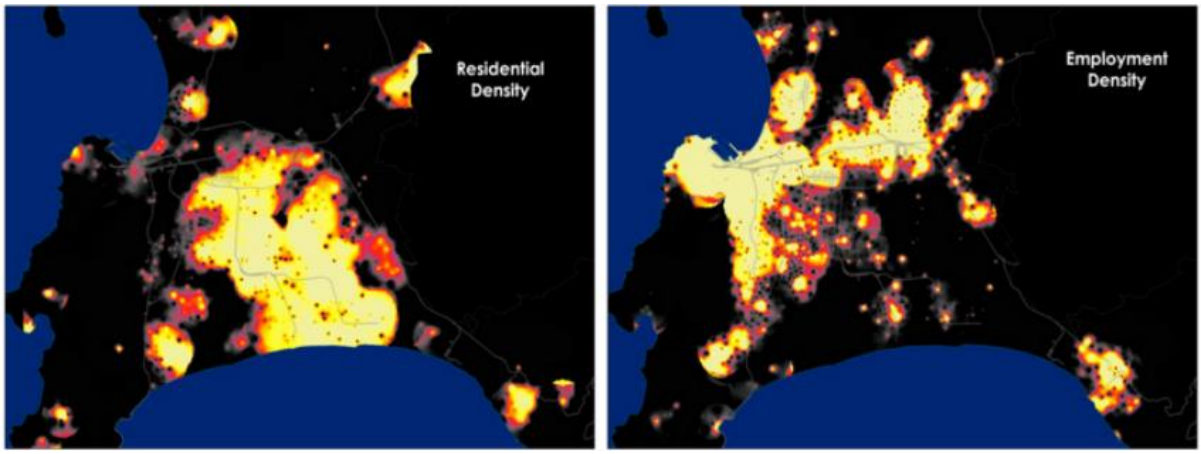

Figure 6 Employment and residential density in Cape Town

Mobility in Cape Town and Khayelitsha

The current transport system in Cape Town consist of a combination of four transport services: there is a train service, a scheduled bus service called Golden Arrow, the informal industry of minibus taxis, and thus since 2010 the BRT MyCiTi was added to this mix.

All have varying routes, modes of operation and therefore suit a variety of needs. Interestingly, the various modes of transport are also managed by different levels of government: the train falls under the national mandate, the Golden Arrow is part of the provincial government while MyCiTi and the taxi industry are managed locally by the municipal government (Rayle, 2017).

Taxi

A large transport provider in Cape Town and Khayelitsha is the so-called taxi industry. These are informal operators that drive in minibuses: in Cape Town these are Toyota Quantum that are allowed to carry 15 people. The taxis are obliged to follow licensed routes, however they do not have designated stops. A passenger can board or get off when he or she indicates it as needed. Payments are conducted in cash and to be organized among the passengers. Usually each taxi is managed by a driver and a companion who helps people board, collects the fares and recruits passengers along the route. Within the city there are several so-called 'taxi-ranks' that are provided by the city and serve as transport hubs. Here the routes come together and interchanges are possible. In Khayelitsha, for example, taxis drive through the area, collect passengers and bring them to the main taxi rank, from where the taxis to Cape Town center (or other areas) depart. Taxis do not follow a time-schedule, they depart only when all seats are full. Also, they mainly operate during high demand times, in off peak hours there are much less taxis available.

Golden Arrow

Golden Arrow is Cape Town's original bus system. It has a dense network of routes and stops and operates a fleet with large coaches. Golden Arrow drives according to a determined schedule. Tickets can be purchased on the bus with cash, but there are also weekly or monthly tickets available. These can be purchased at the major transport hubs or through a mobile ticketing kiosk that attends residential areas at scheduled times. Tickets come in the form of a 'click-card' or on the recently introduced 'smart-card' which operates through an electronic

ticketing system by checking in on a machine on the bus. Stops are demarcated by either a sign along the road, and on some occasions concrete bus shelters are available, however sporadically.

Train

The train line within Khayelitsha connects the area with Cape Town Central Business district. In between there are various stops at all major other residential areas along the route, as well as at employment hubs in Salt River and Woodstock. At the moment the train system is going through a heavy crisis, which results in unreliable service and unsafety. The train do run regularly between Khayelitsha and Cape Town, however are subject to heavy delays and do not really follow a timetable anymore. Tickets can be purchased and the stations, and monthly subscriptions are available. The train fleet that operates in Khayelitsha is damaged by vandalism and lack of maintenance, therefore many trains that operate do not have windows or doors.

MyCiTi

MyCiTi operates in two forms in Cape Town. In the city center MyCiTi can be considered a full BRT system: it has closed boarding stations, pre-boarding payment and demarcated bus lanes. The routes of MyCiTi that go to Khayelitsha and Mitchell's plain, called the N2-express, have a slightly different design. Firstly, there is no dedicated right of way for MyCiTi to these areas only. A bus lane is dedicated during rush-hours, however this is also open for use for Golden Arrow and Taxis. Here, payment is also conducted by loading points on a 'smart-card' however in Khayelitsha there are no stations, which makes it necessary to check in and out on the bus. Within Khayelitsha there are several stops, after which the bus directly goes to Cape Town CBD. The main difference with the Golden Arrow bus service is therefore this direct route, and the design of the busses.

Modal Split

With regard to transport in Cape Town, by far the most used mode of transport is the private car, which accounts for 53% of all trips during a typical weekday in peak hours. After that comes train (18%), then minibus taxi (12%), then non-motorized transport (9%) then Golden

Arrow (6%) and last comes MyCiTi which accounts for 2 % of all trips in 2015 (City of Cape Town, TDA, 2014).

However, the modal split for lower income groups shows a very different image: there only 17% makes use of private transport, and 71% uses public transport, next to 12% who use some form of non-motorized transport (City of Cape Town, TDA, 2014).

Because of the spatial mismatch between work and residential location, Cape Town's transport is characterized by long travel times as a result of congestion, for all population groups and transport modes. City-wide, the average travel time to work lies around 50-60 minutes, for all income groups. To education, the average travel time lies around 30 minutes. Residents from Khayelitsha and Mitchell's Plain experience the longest and slowest work trips (City of Cape Town, TDA, 2014). However, it should be noted that this information is based on the most recent household travel survey, which was conducted in 2013. The data for Khayelitsha in those surveys is rather limited, when looking at the data-set many missing values were found, which made the insights for Khayelitsha specifically limited. Therefore here only information on the city level are reported.

Travel time

The NHTS data indicates that the slowest mode of travel was the Golden Arrow bus, followed by the train, and that MyCiTi and minibus taxis are the fastest options. However, since the census, the situation regarding the trains has deteriorated, which results in the train being now the slowest and most unreliable option of transport in Cape Town. Also, the N2-express of MyCiTi was not operational yet.

From the survey conducted for this study it showed that currently the train is the slowest mode of transport, followed by Golden Arrow, then MyCiTi and taxi is the fastest mode of transport from Khayelitsha to Cape Town. Also when waiting time is included, respondents report the longest waiting time for the train and the shortest waiting time for the taxi.

Costs

All public transport systems in Cape Town make use of a distance-based fare system. With regard to costs, during peak hours MyCiTi is the most expensive mode of transport for residents of Khayelitsha. In order to take a taxi to Cape Town most people take a taxi within

Khayelitsha to the central taxi rank. This trip costs 10 rand, and taxi to Cape Town costs 19 rand per trip. Thus a complete trip costs 29 rand.

For Golden Arrow and MyCiTi subscriptions that provide some discount are available. MyCiTi operates differing fares during peak hours, which makes a trip from Khayelitsha to Cape Town cost 20 rand. In off-peak hours, it is 14 rand(MyCiTi.org.za, 2019). Golden Arrow only has peak fares when paid with cash, and as most users buy a monthly or a weekly ticket, a single trip for them is 14 rand which makes Golden Arrow the cheaper option during peak hours (Cape Argus, 2018). The most cheap option, however, is the train, which costs 6,50 if a weekly ticket is purchased (Cape Town Trains, 2019).

Policy background

Considering the state of the transport system in Cape Town, the city deemed it necessary to implement an additional transport mode. The main motivations that policy officials mentioned to implement a BRT system was firstly to resolve the large congestion problems and add capacity to the current system. Furthermore, it was considered necessary to lower transport costs and to improve the user experience of the public transport (Rayle 2016). In addition, the main policy documents state that the BRT is meant to be used as a tool to overcome the spatial inequalities inherited from the Apartheid policies. The MyCiTi trajectories that are already operational are part of a larger transport policy framework, which aims to integrate and extent the BRT network to other main economic areas of the city, with the aim to improve economic and social wellbeing of residents of metro southeast. The motivation to do so is because currently these corridors are not serviced by rail, and considering the problems with rail also not expected to happen.

5 MOBILITY DESCRIPTIONS

The previous chapter shortly introduced the transport system in Cape Town. However, in order to get a better grasp of the functioning of the system and the user needs interviews were conducted with users of all modes of transport. By this it became clear that all transport modes have positive and negative aspects, and based on people's personal situation a trade-off between these was made which resulted in a mode choice. However, it should be noted that most respondents used a combination of modes for various activities. The presented experiences here relate mainly to the trip that is most often undertaken: the trip to work.

Table 1 Characterization of the respondents

Respondent	Gender	Age	Living Area	Main activity	Conducted by
MyCiTI					
R1 – 31/3	Female	26-30	Site B	Domestic worker	Rianne
R2 – 31/3	Female	51-55	Site B	Domestic worker	Rianne
R3 - 3/4	Female	21-25	Ilitha Park	Unemployed	Rianne – Ursula - Renee
R4 – 9/4	Male	56-60	C-Section	Conference attendant hotel	Rianne
R7 – 5/ 5	Female	31-35	Site B	Cleaner	Rianne
R8 - 7/5 P3	Male	26-30	Mandela Park	Student	Rianne
R9 - 11/5	Female	36-40	Kuyasa	Nurse	Rianne
R14 - 19/5	Male	21-25	Site B	Software developer	Rianne
R18 - 28/5	Male	21-25	Ilitha Park	Call Centre	Rianne
V – 27/2 P1	Male	31-35	Ilitha Park	Entrepreneur	Ursula
Taxi					
VII – 1/4	Female	31-35	Makhaza	Kitchen assistant	Rianne - Ursula
VIII – 1/4	Female	26-30	Makhaza	Kitchen assistant	Rianne - Ursula
R8 7/5 P1	Male	21-25	Site C	student	Rianne - Ursula
VI - 16/3	Male	31-35	Vilakazi	Kitchen assistant	Ursula

IV – 27/2	Male	31-35	Ilitha Park	Entrepreneur	Ursula
Ren 4-4 - 1	Female	36-40	Blue Downs	cook or cleaner	Renee
Ren 4-4 - 2	Female	36-40	Site B	cook or cleaner	Renee
Golden Arrow					
R8 7/5 P2	Male	21-25	E section	student	Rianne
R13 19/5 P1	Female	51-55	Site B	domestic worker	Rianne
R13 19/5 P2	Female	21-25	Site B	unemployed	Rianne
R16 25-5	Female	51-55	Site B	domestic worker	Rianne
II – 22/2 P1	Male	31-35	E section	unknown	Ursula - Renee
II – 22/2 P2	Male	31-35	E section	unknown	Ursula - Renee
Train					
R15 23/5 P2	Female	46-50	Site B	unemployed	Rianne
R15 23-5 P1	Male	36-40	Site B	unemployed	Rianne
R17 -26/5	Male	26-30	Site B	security	Rianne

Table 1 provides an overview of the respondents in this study. There are 10 users of MyCiTi, 7 users of taxi, 6 users of Golden Arrow and 3 users of train. However it should be noted that next to the other modes, within Khayelitsha everyone used taxi regularly. Also, many people travelled with the train before. Thus the perceptions represented are mostly coming from first-hand experience. The categorization above is based on the trip people undertake to go to Cape Town, as that is where MyCiTi is actually available and experiences can thus be compared.

Table 1 shows that respondents reside in the various areas of Khayelitsha. Furthermore, the different respondents represent a variety of professions. All respondents work in low- or medium-paid jobs. In Cape Town many people from Khayelitsha did not receive tertiary or vocational education and as a result, many people work as security guard, domestic worker or in the service sector as kitchen assistant or in hotels (Seekings, 2013). However, some of the younger participants were able to secure a job in a call center or in the ICT sector and as a result they had higher levels of income. In the interviews it was attempted to get insight in the budgets of respondents. However, this was a delicate topic and eventually it was decided to aim more on discussing the impacts of transport costs instead.

Travel descriptions

The interviews revealed a detailed insight in travel patterns and experiences of the respondents. Figure 7 illustrates where the destinations of the respondents are located in relation to Khayelitsha. As can be seen in the map, the travel destinations are strongly concentrated around Cape Town's central business district and the area of Sea Point, an important tourist area where many hotels, restaurants, bars and shops are located. The destinations of the respondents reflect the economic layout of Cape Town, these areas are the major employment areas of the city. The distance between Khayelitsha and these destinations is about 30 to 50 kilometers.

Figure 7 Travel destinations interview respondents

How do people travel?

To understand better how each respondent traveled detailed information about the trip was gathered during the interviews and aggregated for analysis in table 2. As table 2 shows, most people have to use at least two modes of transport to reach their work destination. Only for Golden Arrow this is not necessary as this mode of transport has more routes and stops. For each trip, a person has to walk a distance to the start of a transport route, and at the end a short walk also has to be made. However, where the table says 'walking' for a mode, this indicates that this person opted to walk where using transport would have been considered suitable. The main motivation for respondents to do so was to save money or because walking was faster than waiting for the connecting means of transport.

Travel time

The most reliable indicator of travel time was found to calculate the difference when people usually leave their house and when they arrive at work. When asked for total travel time, some respondents found this difficult to estimate as it was dependent on traffic. Also, walking time and waiting time was often not included. Nevertheless, table 2 shows that all respondents travel for at least an hour, but usually longer. During peak hours, this can add up to two to three hours. Some respondents were in the position to travel after peak hours, which not only made their trip much shorter in terms of time, but also they could profit from the off peak fares. However, the types of jobs often also require shift work and early starts: 13 respondents leave their house before 7 am.

The walking times indicate that the respondents walk between 5 to 15 minutes to the start of their mode of choice. However, these times are a bit obscured, because respondents that have to actually walk further to the transport that they would like to use, are often forced to take a taxi within Khayelitsha, or choose another mode of transport because of safety reasons.

Costs

The costs reflect the differences in fares, however in the interviews it was also considered what the costs are per month. This can vary since some users take one mode in the morning, but another in the afternoon with the aim to save money. Also, for two respondents the employer covers the costs of transport, and for one respondent the employer provides

transport back home after work, resulting in lower costs for these users. Table 2 shows that users of taxi spend double the amount that most users of Golden Arrow spend, and seven times what a train user spends. The costs for MyCiTi users are lower than one would expect based on the fare information. This is because the users specifically chose to travel after peak hour, to catch the lower fare. Of course, this was only possible for those who could arrange this with their employer.

Respondent	Destination	Mode 1	Mode 2	Mode 3	Time leave house	Work start time	Total travel time	Walking to transport	Reported travel time	Costs per month
	MyCiTI									
R1-31-3	Camps Bay; Sea Point; Cape Town	MyCiTi	MyCiTi		8.00 - 10.00	varies		10		
R2-31-3	Sea Point	MyCiTi	Taxi		8:00	9:00	1 hr			0 (paid by boss)
R3-3-4	Sea Point	MyCiTi	MyCiTi		9:00	n.a.		5	60	
R4 - 9-4	Sea Point	MyCiTi	MyCiTi					10		
R7 - 5-5	Bo-Kaap	MyCiTi	Walking		8:00	9:00	1 hr	10		600
R8-3 7/5	Sea Point	MyCiTi	MyCiTi		6:00	9:00	3 hr	10	150	700
R9 11/5	Sea Point	MyCiTi	MyCiTi		17:00	19:00	2 hr	5	55	600
R14 19/5	Cape Town	MyCiTi	Walking; MyCiTi		8:00	9:00	1 hr	7	50	400
R18 - 28/5	Maitland	MyCiTi	MyCiTi		6:40	9:00	2.5 hr	5	180	400
V - 27/2 P1	Cape Town	MyCiTi			varies					
	Taxi									
VII	Green Point	Taxi	Taxi	Taxi	5:00	6:00	1 hr	5		1440

VIII	Green Point	Taxi	Taxi		4:45	6:00	1.25 hr	5	60	1440
R8 7/5 P1	Sea Point	Taxi	Walking		7:00	9:00	2 hr		75	1500
VI 16/3	Cape Town	Taxi	Taxi	Walking	5:00	6:30	1,5 hr	15	90	1000
IV	varies	Taxi							5	
Ren 4-4 int. 1	Oranjezicht	Taxi	Taxi		5:00	7:00	2 hr	15		
Ren 4-4 int. 2	Oranjezicht	Taxi	Taxi	Taxi	5:20	7:00	1,5 hr	5		1300
	Golden Arrow									
R8 7/5 P2	Sea Point	Golden Arrow	Walking		6:00	9:00	3	30	100	679
R13 19/5 P1	Rylands	Golden Arrow			7:00	8:30	1,5 hr	2	120	608
R13 19/5 P2	Mitchell's Plain	Golden Arrow						7	30	
R16 25-5	Wynberg	Golden Arrow	Employer's transport		7:15	9:00	1,75 hr			620
II - P1	Salt River	Golden Arrow								679
II - P2	Mitchell's Plain	Golden Arrow								
	Train									

R15 23/5 P2	Cape Town	Train								190
R15 23-5 P1	Sea Point; Cape Town; Woodstock	Train	Walking		4:30	n.a.		10		n.a: dodging
R17 -26/5	Woodstock	Train	Walking		5:15	6:00		8		190

Reasons for mode use

In the interviews it became clear that respondents used a variety of criteria to weigh off their mode choice. Table 3 shows the themes that arose as a result of the question why people chose to use a certain mode (in green), or why they did not use another type of transport (in red).

Reason to choose for a mode	MyCiTi	Taxi	GA	Train
Drop off location	2	1	1	
	2	1	1	
Start Location		3	1	1
	4			
Travel time	5	4		
			4	6
Reliability	6	1		
				6
Costs	2		2	3
	2	6	2	
Safety	2	1		
		5		8
Frequency		1		
	3	1		
Service	1			
Payment method	2		2	
		2		
Image	2			
Comfortability				
				4

The first prerequisite for respondents to use a certain mode of transport is the routing and location relative to one's destination. For some respondents MyCiTi ends closest to their destination, for others that would be the taxi or Golden Arrow. Also the start of the transportation is of influence, respondents mentioned they used their mode of choice because it was closest to their homes. This was not only motivated by convenience, but also because of safety. Respondents tend to limit their walking time as this is perceived as dangerous. Especially for the ones that travel early, when it is still dark, vicinity of transport is therefore an important motivation.

MyCiTi is mainly chosen because of a relative short travel time and reliability. Furthermore, respondents mentioned the cashless system, it's service and safety as a reason to travel with MyCiTi. In this case, safety referred to the safety of the transport itself, MyCiTi was regarded as safe in driving style. The travel costs are a bit less straightforward: some users choose to take MyCiTi because it is cheaper than the taxi. However, MyCiTi is more expensive than Golden Arrow thus it is also mentioned by Golden Arrow and train users as a reason to not use it. Availability was also an important reason to not take MyCiTi: the busses do not drive in a very high frequency (at least compared to taxis), thus sometimes the schedule would not match people's working times.

For the taxis, the main reasons for use that respondents mentioned why they use is also short travel time, reliability and safety. Safety in this case did not refer to transport safety: generally taxis are perceived to be very unsafe in their driving. This why others mentioned why they would rather not take a taxi. Here, safety refers to chances of incidents such as robbery, which are perceived to be very low on taxis. A main difference with MyCiTi is that taxis are more widely available throughout Khayelitsha. The main reasons that respondents did not want to take a taxi were the costs and the payment method. Taxis have to be paid in cash, and they do not have any form of subscription, which was experienced by most respondents as a negative aspect of taxis.

The respondents that use Golden Arrow as their main mode of transport do so because it is cheaper than taxis and MyCiTi, and because they have weekly or monthly tickets available. Subscriptions are perceived to be beneficial not only because they provide some discount, but also because it is then not necessary to carry cash. That is considered beneficial as it

decreases chances of robberies while walking to the transport. Users of other modes mainly reported they did not take Golden Arrow because it has a very long travel time as a result of the many stops along the routes. This is on the other hand also the reason why some respondents use it: Golden Arrow connects Khayelitsha to stops that the other modes don't go to. For users of train, the costs of Golden Arrow are a reason to not use this mode.

With regard to the train, there was only one reason why respondents would choose to take a train and that is because of the costs. As was mentioned before, the trains are very affordable. Only the respondents that really could not afford to take another mode of transport would travel with the train. Anyone else that could by any means pay for the other modes of transport would do so, because generally trains are perceived as very unsafe and unreliable, also by the ones that do have to use it.

6 PERCEIVED ACCESSIBILITY

The following chapter presents the information that was gathered in order to understand how the different aspects of accessibility are experienced by the respondents. In the interviews various questions were asked with regard to perceived accessibility in general, as well as experiences on all the seven factors of the framework by Church et al (2000). Once an overview about the accessibility of the transport system was gained, it was also possible to interpret whether MyCiTi was able to improve that specific degree of accessibility. The first part of this chapter explores each aspect of accessibility, and gives more of an overview. The second part has the specific purpose to interpret the differences between the various modes. Only by interviews it is hard to quantify certain differences in modes. For example, from the interviews it seemed that safety and transport costs were perceived somewhat less problematic for users of MyCiTi than for users of other modes. However the sample of interviews was too small to substantiate such indications. The analysis of the survey does enable this, the outcomes are presented in the second part of this chapter.

6.1 INTERVIEW OUTCOMES

The following section elaborates on the outcomes of the interviews that looked into the accessibility of the transport system in Khayelitsha.

Safety – fear-exclusion

The overall image that arose from the interviews is that safety is an important factor that diminishes people's ease of travel. During the interviews safety was mentioned as a desired improvement by users of all transport modes. However there is some variation in severance of unsafety. The trains were perceived to be extremely unsafe, where there is a high risk of robbery, but also vandalism. The trains are damaged as a result of vandalism. Simultaneously it was reported that along the rails people throw stones, which can hit a person as there are no windows or doors in the train. With regard to actual exclusion, the train was the only transport where the respondents felt they could not use this type of transport as a result of safety.

Nevertheless, all kinds of transport were considered to be unsafe, although answers were mixed. Sometimes respondents would first mention the transport was relatively safe, only to recount a story of experienced robbery later on. This quote from respondent R7 illustrates this:

I: Okay that's good. At least. And do you think the MyCiTi, do you feel MyCiTi is safe to travel with?

R: Yes, it's safe. It's safer than taxi, safer than train. But it's not 100 percent safe, things are happening.

I: Yeah like what? Why is not 100 percent safe?

R: MyCiTi here in Khayelitsha, MyCiTi is robbed many times. Sometimes the bus is too much full, doors not close properly, it's not 100 percent. But it's safe.

This quote shows how perspective on safety is personal and context dependent. The respondent considers MyCiTi safe because it is safer than the taxi and the train. Additionally, when respondents mentioned they felt safe on the transport and in their area, they mentioned that is was safe *for them*. This was because they grew up there and knew the people around. Generally there is a high risk on robberies, however the so-called *skollies* [=criminals, gangsters]do not rob the people that they know, because of risk to be recognized. Others that stated that they felt safe mentioned that is was so because they didn't have to walk too far. This indicated that maybe it is not safe but only because they don't have to walk far they are not as exposed to the risks.

The main types of unsafety recounted during the interviews involved stories relating to exposure to risk of robbery while walking to the start of the transport. In addition, for the Golden Arrow and MyCiTi there was also a risk of robbery on the transport itself. With regard to taxis, the situation is somewhat different because on the transport itself it was widely agreed that nothing will happen, because criminals do not attack taxis as the taxi industry is known to take matters in their own hand in such a case and deal with the skollies in an extremely violent manner.

The majority of the respondents has experienced a robbery or seen instances of robbery or assault. Respondents had various strategies to try to be as safe as possible. Firstly, some respondents felt forced to take a taxi instead of walking to the start of their mode of transport.

However, for many people this is too expensive, and therefore respondents mentioned other strategies. For example, respondents would only walk in groups, they would avoid walking in the dark, or generally avoid quiet places also during daytime, as alone one is a more vulnerable target. Also, respondents would time exactly when they would go to the bus stop, so that they do not have to wait there very long. Another respondent explained she formed a travel group with women that take the bus at the same time each day, so they travel together to keep each other safe. However, they also all acknowledged these strategies have only a limited effect.

Even though respondents employed strategies to improve their safety, they also mentioned they are forced to expose themselves to the risk because they have to travel. The jobs that are available require them to take the transport, it is not possible to find a job that does not involve using a certain type of transport. They have to make the best out of the limited options they have.

Impact of MyCiTI

One of the aspects of BRT systems is that they are considered to be more safe because they drive in dedicated lanes, have closed stations which can only be boarded with a travel card, and possibly have security guards available. This is the case in Cape Town city center, however all this is not available in Khayelitsha. This was also mentioned by the respondents during the interviews, they repeatedly requested that security personnel and improved infrastructure would be beneficial for the transport safety. Currently, MyCiTi is considered to be more safe than the train, but it was not experienced as safer than the Golden Arrow or the taxis.

Affordability – financial exclusion

Table 2 already showed the variation in transport costs per respondent. During the interviews, not only the amount was considered, but also the impact that the travel costs have on the household budget. Only in three cases, the transport costs were considered affordable. Those cases were users of MyCiTi, who were in a better financial situation because of their job and due to their working times they could save on travel costs. However, for the majority of the respondents the transport costs were considered a big burden. The costs represented in table

2 display the costs that particular respondents paid for their travels per month. However, for most respondents the costs were in fact higher, as they had also family members that relied on their income to cover their transport costs.

Respondents identify that within their budgeting, the transport fare has the absolute priority as the transport is the key to their jobs. Almost everyone replied to this question in some form or the other that the costs are too high, but they have not choice than to put up with it. The severity of the impact of the transport costs is explained by the following quote by R16:

T: It's difficult but I have to because I need to work so that I can have something on top of the table so.

I: So how do you make sure then, even if it's difficult, that you can pay it?

T: [translates]

R: [Xhosa]

T: So… by the way it's so difficult. I run out of money and maybe I don't have money to buy ticket again. So I have to sometimes make means to pay cash for the bus, if the ticket expired before time. Or else if I have to buy groceries I have to leave other items for the ticket.

I: So you save on groceries to be able to pay this?

T: Yes.

Multiple respondents made clear they had to cut on spending for basic needs to be able to pay for the transport fares. In addition, some respondents stated to have to take a loan or gift from others, go for overtime at work. Another way to save money was to take the train home, or walk a part of the journey to save money.

However, generally there was very little space for the respondents to maneuver since the work destinations are far from their living place and there is not much variation with regard to costs in the different modes of transport. Only the train would be a more cheap option. However, for most respondents using the train was out of the question. Respondent R8-P1 mentioned on this matter:

I: So when you think about affordability, would you consider going by train or would you then think no I'm not going.

R1: When it goes to affordability, it's affordability versus your safety.

More respondents stated clearly they had to consider a trade-off where safety and affordability had to be weighed against each other. Those who could by any means afford it would thus put up with the high costs, and even safe on groceries, rather than travel with the train. In relation to this respondent R16 stated:

R: You have to see for yourself. You don't just go oh this is cheaper. No you must look to see your future self.

However, for the respondents in the sample that were unemployed, such trade-offs were not really available. All the transport modes were too expensive for them. For them the train provided a way to travel still, even though it was still highly unsafe it also provided an opportunity to travel to Cape Town to seek work. One of the 'upsides' of a negative aspect of the train was that because it is so poorly controlled and maintained, it is not necessary to buy a ticket for the train. Thus, the train provided the unemployed respondents with free transport.

The transport costs do not directly have a strong impact on the trips that people make for work. This is because as the quotes of the respondents identified previously, those trips have to be made. However, the transport costs do influence people's transport options, and as a result whether they can choose a mode that has a shorter or longer travel time. Thereby it indirectly impacts also people's mobility. Due to the limited resources, respondents would opt to walk or take a slower mode of transport. This resulted in the longer travel times.

Impact of MyCiTi

MyCiTi does provide a slight improvement regarding the financial accessibility of transport to Cape Town. It is considerably cheaper than the taxi and has a similar price to Golden Arrow. As a result, users that previously used another mode where quite content with the affordability of MyCiTi as they now made less costs. Nevertheless, also current users of MyCiTi struggle to pay the transport fares. Furthermore in relation to providing access to opportunities to the urban poor, MyCiTi has limited capacity. For the unemployed people that were interviewed, MyCiTi was considered completely inaccessible due to its costs.

Time

Travel time is an important factor that decreases the ease with which respondents can reach their desired destination strongly. Long travel times were a major problem for the respondents of all modes. As mentioned before, all respondents traveled at least an hour one way, but usually this was longer. Long travel times are mainly caused by congestion and overcrowding. All modes of transport struggle with congestion on the N2, as well as long lines during peak hour to meet demands. There is a large difference between the experience of the respondents that have to travel during peak hours, and the ones that do not. The following two quotes illustrate this:

R14 experiences the travel time as doable and easy:

[…] So that's why I chose to travel after 8. Cause I'll still get there early. Cause it's mostly 30 minutes, because there's a bus lane on N2, since it goes straight down on the freeway, there's a bus lane, so it just goes straight. So even if I had a car I wouldn't drive to work.

However, respondent VI, who has to travel during peak hour, explains:

P: Because some taxi's went to the location to collect people, there are peak hours. Around 5 it is very busy and the traffic is heavy congested on the road. So the lines can be long .. and you wait maybe for a taxi almost close to an hour.

I1: Oh man ..

P: It is a waste of time actually, if you don't have your own transport, you suffer.

As was mentioned at the costs-section, various respondents mentioned that they would walk or take a the train back home to save money. This results in longer travel times for these respondents. In the morning travel time is more important because the respondents have to be at work on time. But in the afternoon or evening this was considered less important.

From the interviews it became clear that time aspect of accessibility was the most direct factor that prevented people from participating in society. The respondents do participate in society, because they have work and thus are not completely socially excluded. However, as a result of the long travel times, they reported to have very limited time left for other activities. However, not only the transport system is responsible for the limited ability to engage in activities. Respondents also remarked that their long working hours, combined with

early morning starts or shift work results in limited time, but also energy, to undertake activities apart from the absolute necessities.

Impact of MyCiTi

MyCiTi does provide some gain in travel time in relation to Golden Arrow as it only has several stops within Khayelitsha and then goes straight to Cape Town. However, the impact of MyCiTi is not as strong as would be expected of a BRT system, because it does not follow the design principle of a dedicated right way. In Cape Town central business district, MyCiTi does have a separate lane and thus profits of quicker movement through traffic. However, the N2 express shares a bus line with both the taxis and the Golden Arrow. The respondents report that this is not sufficient to decreasing travel time as congestion still occurs.

Geographical and facility-related access

The geographical aspect of access might be the factor that is most difficult for Cape Town to overcome. As described in the context description, the Apartheid government specifically designed areas such as Khayelitsha with the aim to geographically and socially exclude the non-white population of South-Africa. The spatial layout of the city that is inherited from this time still affects its residents daily.

The geographical location of Khayelitsha influences people's mobility mainly in the sense that it makes the residents fully transport dependent. Historically, the vast majority of economic opportunities, but also many facilities are located outside the township. As a result the opportunities can only be reached through any form of motorized transport. For most respondents, moving to another part of the city is simply not affordable.

Impact of MyCiTi

The geographical aspect of access is in itself a problem, but strongly affects the cost and time aspects of transport as well. All transport systems are using a distance-based fare system. The transport costs increase the further someone lives away from opportunities, further diminishing the accessibility. By using a distance-based fare system, MyCiTi also reinforces the geographical exclusionary spatial layout of Cape Town. Respondents were well aware of this, as this quote by respondent VIII shows:

I2: And are there areas you would like to go, but that you cannot access because of a lack of public transport options? Or can you go anywhere you want to go?
P: Yes, sometimes you must leave a place, you understand? Because you have to think about yourself, cause you need money, you understand? So now, sometimes you decide to go and stay at another place, that you will leave Khayelitsha, but you don't .. because the only thing is that you cannot afford. You cannot afford to Sea Point, despite the fact that Sea Point will be good for you. You understand?
I2: Yes, I do.
I1: So you looked into moving closer to work?
I2: Yes, but it is very expensive?
P: Yes .. but also now, the taxi's are very expensive, because every day I am using 60R.

Geographical exclusion is closely related to facility exclusion. For employment opportunities but also other services such as education and healthcare it is often necessary for the respondents to travel outside Khayelitsha. Facilities such as schools and clinics are available in the area, however these are perceived by the respondents of low quality and limited capacity. If it can by any means be afforded, parents send their children to private schools outside Khayelitsha. The only necessity that is sufficiently available within Khayelitsha is the possibility to go grocery shopping.

Space exclusion

Actual exclusion of spaces, as was the case in the Apartheid time, it not as strongly present anymore. Most respondents stated that they can go everywhere that they want to go to. However, the strongly segregated character of Cape Town is still present which does influence people's mobility. When asked about whether they can go everywhere they want, respondents answer that in principle you can, but that there are certain places in Cape Town that they don't have any interest in going to. For example respondent R8-P3 stated:

R3: It's a suburb, Constantia. So the reason I don't like going to such places, I don't feel like I fit in. Their walls are too high. If you don't know anyone in those kinds of spaces, there is no

reason for you to be there. This is like, for some this is like the biggest place, or the coolest place they will ever be at. Next to the waterfront. So there is I think more, it is like this we live in the community, so the community that we know mos, there is a difference from that side, there is a huge difference. So due to the things that we see on a daily basis we don't try too much to even go there because we don't know someone that lives there, to be there. So we create friendships amongst each other and then you go around seeing each other on a weekly basis. Because it doesn't take much time for me to travel to his neighborhood, or to his neighborhood.

This is also supported by the findings that show the places that respondents tend to visit. The only mention to go to Cape Town for work, and very rarely for recreation. However, all other activities take place within Khayelitsha or other black townships.

Desired improvements

The previous part provided in insight in the dynamics of the various dimensions of accessibility. To understand which aspects were actually considered most pressing according to the respondents they were asked what they found particularly important problems and what where efforts of improving the transport system should be directed. Table 4 provides an overview of the outcomes of these questions.

Table 2 Experienced problems at own mode of transport

Problems mentioned	**MyCiTi**	**Taxi**	**Golden Arrow**	**Train**
Overcrowding				
Traffic				
Technical issues				
Vandalism				
Separate issues		Unsafe driving		Lack of information
		Expensive		
		Rude drivers		

As table 4 shows, per mode very similar problems were experienced. The main issue that was mentioned for all modes is overcrowding, even though in the train this issue is much more pressing than it is in the other modes of transport. Overcrowding refers to actually full vehicles, or an overloading of the vehicles, but also long waiting lines during rush hour to go to Cape Town, and in the afternoon to come back to Khayelitsha. This is the case for all modes of transport. Then, the second most important problem reported by respondents is the traffic issue. This is due to the large congestion issue that Cape Town is facing on the N2, the main road identified in figure 7 where the MyCiTi, Golden Arrow and Taxis to Cape Town drive past. However, also the respondents that travel to other destinations identify this as an issue. The issue of traffic problems results in long travel times and problems at work because respondents identified they would arrive at work late as a result of the congestion. Of course, the train does not have to deal with traffic. Nevertheless travel times are even longer there because of one of the other problems, namely, which are technical problems. These are most pronounced for the trains that deal with extreme delays, the reasons for which are unclear and also not reported to passengers. To a much lesser extent, technical issues are also mentioned by users of MyCiTi and Golden Arrow, but then it refers more to relatively minor issues such as leaking doors.

Related to the experience of the travel it was also asked what respondents would like to see improved about their mobility. For all modes the respondent requested that the capacity of the transport system would be increased, in the form of either more busses, trains or taxis per hour to be able to do something about the problem of overcrowding in the transport. For MyCiTi it was mentioned to get more busses per hour, longer busses, more routes to other areas. For Golden Arrow respondents also would like to get more busses, even though more routes were not deemed necessary as Golden Arrow already has an extensive network. After the issues about capacity and meeting the travel demand, the next issue that was raised for all modes of transport was that security and safety should be improved. Related so safety the respondents suggested to provide security personnel on the busses and trains. Multiple respondents remarked on their own initiative that this really has to be security personnel, and not cameras, since camera's 'just look' (R4). This was not considered necessary for the taxis, as taxis are perceived to be more safe.

Thus, from these results it showed that respondents consider the time dimension and the safety dimension of accessibility the most important to address. Interestingly, no one mentioned affordability as a matter that should be improved even though the description above shows that this could be considered a pressing issue as well.

6.2 SURVEY OUTCOMES

The interviews provide interesting insights in dynamics of travel and motivations and experiences of the users. However, by means of only interviews it is difficult to interpret how the differences between modes relate to each other. Since it was not possible to quantify statements and experiences in the interviews, a survey was conducted to do so.

ANOVA analysis results

The analyses investigated the differences between the different modes of transport for six outcome variables that have an influence on the accessibility of the public transport: *travel time, safety, affordability, reliability, availability, comfortability.* Even though the survey allowed for respondents to state when they used a combination of modes for their travels, the current analysis focused on the participants who used only one mode of transport. This is because we aimed to investigate the differences between the modes, and in relation to MyCiTi specifically, and a combination of modes makes it difficult to entangle the specific characteristics of each mode. The means and standard deviation per mode and per variable can be seen in table 5. It becomes apparent that the standard deviation circles around 1 for each variable. Considering that the scale only ranges between 1 and 5, this indicates that people differed moderately in their assessments. Further, to enable comparisons between modes, all means are displayed in Figure 1. In this Figure, a clear pattern arises. All modes receive relatively similar scores, except for the train, which seems to be most affordable but least safe, reliable, available and comfortable.

Table 5 Mean and Standard Deviation per mode

	Train	Golden Arrow	MyCiTi	Taxi
Travel Time	1.33 (0.62)	1.47 (0.72)	2.10 (0.89)	2.21 (1.32)
Affordability	4.27 (1.39)	2.71 (1.57)	3.10 (1.67)	2.28 (1.44)
Safety	1.47 (1.13)	2.94 (1.64)	3.19 (1.44)	3.07 (1.07)
Reliability	1.53 (1.13)	3.59 (1.37)	3.81 (1.36)	3.38 (0.90)
Availability	1.40 (1.06)	3.53 (1.66)	2.52 (1.44)	2.69 (1.31)
Comfortability	1.47 (1.13)	2.82 (1.47)	3.76 (0.94)	3.38 (1.01)

An ANOVA was conducted for each outcome variable to investigate if there was a difference in the specific variable between the different modes of transport. The ANOVA showed significant results for each outcome variable, indicating that the different transport modes differ in these variables. See table 6 for specific outcomes per variable. Subsequently, for all six outcome variables a post-hoc test was conducted to investigate which specific transport modes differed. The outcome of these post-hoc tests as well as a descriptive comparison between the modes are discussed per outcome variable.

Table 6 Results from the ANOVA test

ANOVA Results			
Mode	Df	F-Value	P-Value
Travel time	3	3.789	0.0136 *
Affordability	3	5.867	0.00115 **
Safety	3	6.273	0.000719 ***
Reliability	3	12.76	7.22e-07 ***
Availability	3	6.378	0.000637 ***
Comfortability	3	13.72	2.85e-07 ***

The table displays the outcomes of the ANOVA test for all six variables.

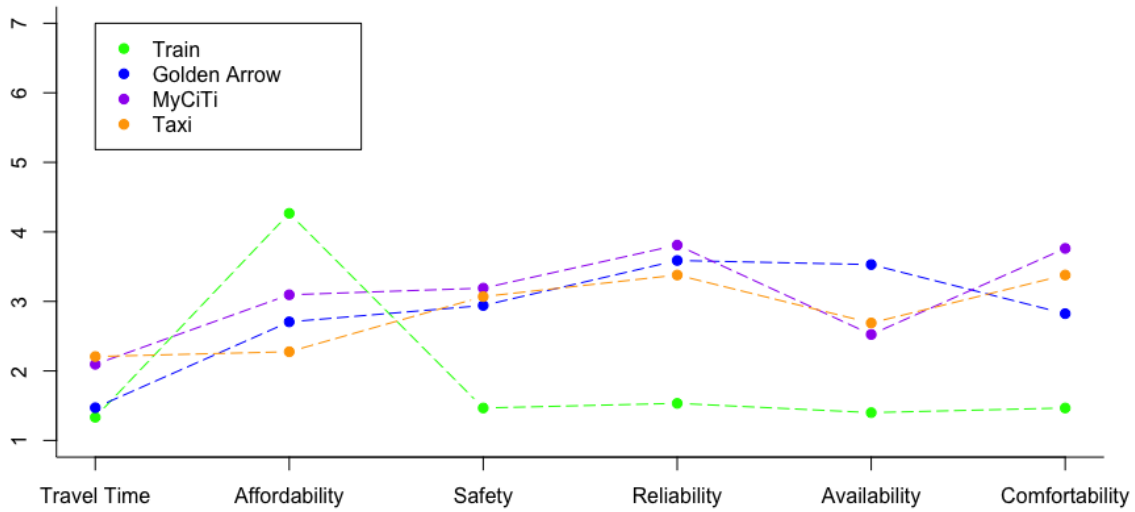

Figure 8 - Mean scores for transport variables per mode

Travel time:

The travel time is based on categories 1 to 5, where 1 means a travel time of 80 minutes or longer, and 5 is a travel time of 0-20 minutes. Taxi and MyCiTi are very close in relation to travel time, however, MyCiTi did not show a significant difference with any of the other modes with regard to travel time. Only the taxi and the train showed a significant difference, taxi scored 2,2 and train 1,3 on average , p =0.04. However also Golden Arrow scored a 1,4, and as shown in figure 8, all modes are dealing with long travel times.

Affordability:

The scores of affordability differed most strongly of all the variables. The train is considered very affordable, and MyCiTi scored second best with regard to affordability. However, MyCiTi's score is not significantly better (or worse) than the other modes, also in comparison to the train. On the other hand, the train scored significantly better than the Golden Arrow (p= 0.02) and taxi (p= 0.00).

Safety:

With regard to safety, the average for MyCiTi, Golden Arrow and taxi lie very close to each other with a mean score around 3. Those three modes are considered more safe than the train, and for all three a significant difference was found with the train (MyCiTi p=0.01, GA p = 0.00, taxi p=0.00). As was expected based on the very close means, among the three other modes there was no significant difference in safety.

Reliability:

Reliability displays a similar patterns as safety: MyCiTi, Golden Arrow and Taxi score significantly higher than the train (MyCiTi p=0.00, GA p=0.00, Taxi p=0.00), and the other modes do not differ significantly from each other.

Availability:

The variable availability has a more varied distribution of the scores than the other modes. Here, Golden Arrow receives the highest score, and MyCiTi and taxi score close to each other. Again the train scores low, which is reflected in the outcomes of the posthoc test. Golden Arrow differs significantly with the train (p=0.00), and so do taxi and train (p=0.02). However, for MyCiTi there is no significant difference between MyCiTi and the other modes, also not with the train.

Comfortability:

For comfortability the scores also lie further apart from each other. MyCiTi scores highest, but only differs significantly with the train (p=0.00), and does not score significantly better than Golden Arrow and taxi. Golden Arrow (p= 0.01) and taxi (p=0.00) also differ significantly from the train.

Discussion of results

To summarize, with the ANOVA test, it was possible to interpret the meaning of the differences in means for six transport variables according to mode. The outcomes of the survey show that MyCiTi receives the highest scores of the four modes for safety, reliability and comfortability. However, the difference with taxi and Golden Arrow is marginal. Between these modes and MyCiTi no significant difference was found for those variables. MyCiTi,

Golden Arrow and taxi all differ to quite some extend to the train on all variables, often yielding significant difference. The taxi scores highest on travel time (also only significant difference with train), and the train scores highest on affordability (significant difference with all others).

Thus, based on the survey results, MyCiTi does not seem to provide a considerable improvement in comparison to the taxi and Golden arrow. With regard to transport aspects, it is a clear improvement when relating to the train. However, as shown in the interviews, the affordability aspect strongly affects the access to mobility in Khayelitsha.

7 CONCLUSION

The research used the framework of accessibility by Church et al (2000). It was found that the ease of reaching destinations can be interpreted as highly difficult for residents of Khayelitsha. The transport system in Khayelitsha is characterized by high costs, general unsafety and long travel times due to the limited capacity of the transport system to meet the travel demand. By introducing MyCiTi on the main congested route between Cape Town and Khayelitsha, an additional transport option was added. Since this route is already served by other transport providers, MyCiTi did not open up new destinations for residents of Khayelitsha. However, it has improved the capacity of the transport system.

Even though it was found in the survey that MyCiTi was perceived to score slightly better on accessibility aspects of safety, reliability and comfortability it cannot be considered a significantly higher accessible mode of transport when compared to the other modes through a statistical ANOVA test. Only in comparison to the trains, MyCiTi can be considered a significant improvement. Nevertheless, it was found in the interviews that even though it might be an improvement in comparison to the accessibility of the train, accessibility of the other modes can be still considered unacceptable. Even though it might not be as profound as the problems with the train, the users of other modes all experience severe difficulties while attempting to reach employment and other daily activities as a result of unsafety, long travel times and high travel costs.

In addition, the geographical and socio-economic context challenge the accessibility of residents of Khayelitsha to livelihood opportunities as well. The housing locations are too far removed from opportunities. Incomes of people are too low because they have received limited schooling and thus limited job opportunities, and the unsafe environment that people live in result in socio-economic disadvantages that cannot be overcome by a transport system alone.

However, it is worth noting that even though MyCiTi was not able to significantly improve the accessibility of residents in Khayelitsha, it's coming to the area did make sure that for a big group of the population the accessibility has also not deteriorated. In the local context where the majority of the people used to travel with the train, MyCiTi provided an alternative. This

might not have opened up new opportunities, but at least ensured that people have also not lost access to their existing jobs.

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APPENDIX A - SURVEY

SURVEY TRANSPORTATION BETWEEN KHAYELITSHA AND CITY OF CAPE TOWN

Date:

Location:

---

1. **What is your sex?**
   - Female
   - Male
   - Other

2. **How old are you?**
   - 18-24
   - 25-31
   - 32-38
   - 39-45
   - 46-52
   - 53+

3. **Where in Khayelitsha do you live?**

---

4. **What is the destination of your journey?**

---

5. **Why did you use public transport today?**
    - Work
    - Education
    - To visit family or friends
    - Groceries
    - Leisure
    - Medical reasons
    - Other _____

6. **Which modes of transportation did you use today?**
    - Train
    - Bus
    - Golden Arrow
    - MyCiTi
    - Taxi
    - Walking
    - Biking
    - Car

7. **Who are you traveling with?**
    - Alone
    - With family
    - With friends/colleagues
    - Others

8. **How often do you travel between Khayelitsha and this place?**
    - Every day
    - 2-5 a week
    - Once a week
    - Once a month
    - A few times a year

9. How many taxi's/busses/trains do you need to reach your destination?

_____

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

- 0-5 minutes
- 6-10 minutes
- 11-15 minutes
- 15 or more minutes

11. How many minutes do you have to wait for your taxi/bus/train to arrive?

- 0-10 minutes
- 11-20 minutes
- 21-30 minutes
- 31-40 minutes
- 41 minutes or longer

12. If you have used more than one taxi/bus/train to get here: How many minutes do you have to wait in between?

- 0-10 minutes
- 11-20 minutes
- 21-30 minutes
- 31-40 minutes
- 41 minutes or longer

13. How many minutes does your whole trip take?

- 0-20 minutes
- 21-40 minutes
- 41-60 minutes
- 61-80 minutes
- 80 minutes or longer

Please answer indicate to what extent you agree or disagree with the statements underneath.

14. Public transport is comfortable

Disagree slightly disagree neutral slightly agree agree

15. Public transport is clean

Disagree slightly disagree neutral slightly agree agree

16. Public transport is affordable

Disagree slightly disagree neutral slightly agree agree

17. Public transport is safe

Disagree slightly disagree neutral slightly agree agree

18. What gives you a safe feeling during your trip?

- Light
- Cameras
- Surveillance
- Cleanliness
- Other _____

19. Public transport is reliable

Disagree slightly disagree neutral slightly agree agree

20. There is enough public transport available

Disagree slightly disagree neutral slightly agree agree

APPENDIX B - INTERVIEW GUIDE

Personal Background

1. Can you introduce yourself?
2. How old are you?
3. Where do you live currently?

   Probe: Which area of Khayelitsha is that?
4. How many people are part of your household?
5. What education did you follow?
6. What is your main occupation?

   Probes: how long have you worked there?

Livelihood Activities

7. Can you describe what are regular day looks like for you

What kind of activities do you do in a day? Do you go shopping/working/taking care of children? What time do you get up?

Travel patterns

8. For the activities that you just described, where are they located?

   Can you show on the map where they are? Are there any other places you go to with public transport?
9. How do you travel to these places?

   Probe: What is the reason you take this option and not something else?

10. How long does that take?

    What time do you leave your house? What time do you arrive at the destination?

11. How much do you have to pay for that trip?

12. What is the reason that you go to these places specifically and not to an alternative?

E.g. a hospital that is closer by?

Experienced Accessibility

13. Do you encounter any problems in accessing the places you want to visit?

    Can you give an example? What do you do to avoid problems?

14. Are there places that you want/need to visit, but you can't?

    What is the reason for this? Anything else: time/costs/safety/location/no connection

15. What aspect of the transport would you like to see improved?

Specific questions for MyCiTi users:

Changes Mobility

16. How did you travel to the different places before you used MyCiTi?

    Only taxi? Or also Golden Arrow/Train? Why this particular option?

17. Were you working in the same place as now?

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

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

    Probe: is your trip shorter/cheaper/more comfortable/more safe?

MyCiTI impact

23. Has MyCiTi helped you to execute your daily activities more easily?

24. Has MyCiTi opened up new opportunities for you?

APPENDIX C - PARTICIPANT INFORMATION SHEET

Project Title: Access to livelihood opportunities through MyCiTi BRT

Principal Investigator: Rianne Hadders

Designation: Master Student

Institute: Utrecht University

Please read this form carefully. If you don't understand the language or any information in this document, please discuss with the researcher. Your participation in this study is voluntary, and you can enquire about all details before giving your consent to participate in this study.

1. Introduction to the research study:

This research is being conducted to explore how people of Khayelitsha travel now and before the implementation of the MyCiTi bussystem. I am conducting this research as part of the Master Program in Sustainable Development at Utrecht University.

2. Purpose of the study:

The purpose of the study is to find out about travel patterns and daily activities of people in Khayelitsha, and the role that different types of transport play therein. Also I am interested if these practices changed over the years, thus questions of the research will deal with these topics now and five years ago.

3. Your participation in the study:

Your participation consists of taking part in an interview. In this interview we would like to hear about your experiences with travelling in daily life and your experiences previously. Also I would like to explore how these travelling experiences influence your income and wellbeing. The interview will follow a list of questions prepared in advance, but anything you want to add is welcome too.

The researcher can visit you at your home to take the interview, or if you prefer to do meet somewhere else this is possible on request. The interview will be conducted in English, or your own native language, according to your preference. If you give consent through the consent form, I will record the interview in order to be able to analyze your answers afterwards.

Your participation in this study is voluntary; you may decline to participate at any time and you need not give any reason for the same, and such withdrawal shall be without penalty.

4. Confidentiality of information:

The collected data will be stored in the researchers' personal computers. The personal details of the respondents will not be used or share with anyone outside the research team. Study results will be kept confidential and will be reviewed only by authorized personnel from the research team or the university supervisors. The data will not be made available to another individual unless you specifically give permission in writing. Information and results from this study may be presented at meetings or published in journals without including your name and personal identifications. No reference will be made in oral or written reports which could link you to the study.

5. New information about the study:

Any new information available during the course of the study will be informed to you if it has relevance to your decision regarding continuing in the study. Results of your participation will be disclosed to you if you indicate your desire for it.

6. Whom to contact in case of any questions:

If you have questions regarding your participation in the study, you may contact the Principal Investigator, Rianne Hadders, as detailed above.

If you have any questions about this form or any study related issue, you may also contact the following person.

Name : Prof. Dr. Annelies Zoomers (supervisor)

E-mail: e.b.zoomers@uu.nl

APPENDIX D – CODEBOOK

Travel main activity	Comfortability		
	Costs		
	Modes Used	Mode first transport	
		Mode second transport	
		Mode third transport	
	Problems	Delays	
		Infrastructure doesn't match needs	
		No problems	
		Overcrowding	
		Lack of information	
		Cash system taxi	
		Driving style	
		Taxi's being stopped by traffic police	
		Taxi's driving without license	
		Technical problems bus	
		Traffic	
		Vandalism	
	Reason for mode used	Reason for Golden Arrow	Busstop closer than other modes
			Cheaper
			Different route
			More reliable than train
			Weekly-monthly ticket available
		Reason to use MyCiTi	Cheaper than taxi
			Customer service
			Dropoff closest to destination
			Easier to understand
			Faster
			Goes to right destinations
			Payment system
			Possible to use google maps
			Reliable service
			Safe driving
		Reason to use taxi	Dropoff closest to destination
			Faster - In a hurry
			More available
			Not safe to walk
			Reliable
			Safer than others

		Reason to use train	cheap
	Reason to not use another mode	Reasons to not use car	Too expensive
			traffic
		Reasons to not use GA	Omwegen
			Rush hour fare
			Takes long
			Too expensive
			Unsafe
		Reasons to not use MyCiTi	Fixed times don't match work hours
			No route to desired destination
			Prefer car
			Stops too far from house
			Too expensive
			Unfamiliar
		Reasons to not use taxi	Cash payment
			Dangerous driving
			Long ques
			No route to work location
			Not available at needed time
			Too expensive
		Reasons to not use train	Delays unreliable
			Overcrowded
			Safety
			Too old to use train
	Route description morning		
	Route description afternoon		
	Safety	Safe	
		Unsafe	
	Travel time		
	Financial situation	Budget overview	
		Impact transport costs	
		Income	

Desired improvements	Golden Arrow desired improvements	Busshelters
		Maintenance of bus
		Security personell
		Separate schoolbusses
	MyCiTi desired improvements	Different routes
		Entertainment on board
		Feeder busses
		Increase capacity N2 express
		More Busstops

		More point-loading possibilities
		More routes
		Safe busstations
		Security personell in bus
		Specific buslane
	Overall desired improvements	Broaden N2 with Public transport lanes
		Participation- consultation
		Safety
		Two person cars
	Taxi desired improvements	Customer care
		Formalize taxis
		Innovate
		More ranks in other areas of Khayelitsha
		More regulation
		No more lines
	Train desired improvements	More trains
		reliability
		Safety
		upgrade network

Activity Patterns	Perceived Accessibility		
	Church		
		Explanation activities	
		Frequency	
		Daily	
		Location	Site B
		Mode to activity	walking
	Description of daily activities		
	Education	High School children	
		Location	Khayelitsha
			Mitchells Plain
		Mode	Walking
			Private transport hire
	Health Care	Clinics	
		Location	Site B Clinic
			Mahkaza Mall
		Grote Schuur Hospital	
		KDH Hospital	Accessibility
		Tiger Berg Hospital	

	Recreation	Location	Camps Bay
			Cape Town
			Century City
			Khayelitsha
			Sea Point
			V&A Waterfront
		Mode to activity	MyCiTi
			Taxi
			Walking
		Reason to use mode	
	Shopping	Frequency	
		Location of activities	Belville
			Camps bay
			Cape Town
			Claremont
			Khayelitsha Mall
			Mahkaza Mall
			Mitchells plain Mall
			Sea Point
			Site B Mall
			Somerset
			Wynberg
		Mode to activity	MyCiTi
			Taxi
			Train
			Walking
		Reason to use mode	Reason to use MyCiTi
			Reason to use taxi
			Reason to walk
	Visiting Family	Costs	
		Frequency	
		Location	Blouberg
			Delft
			Eastern Cape
			Gugulethu
			Johannesburg
			Khayelitsha
			Langa
			Nyanga
			Sea Point
		Mode to activity	Airplane
			Long distance bus
			MyCiTi
			private vehicle
			Taxi
			walking
		Reason to use mode	Reason to use MyCiTi
			Reason to use taxi
		Travel time	

	Visiting friends	Location	Blouberg
			Cape Town
			Gugulethu
			Mahkaza
			Mowbray
			Nyanga
			Salt River
			Strand
			Wynberg
		Mode to activity	Golden Arrow
			MyCiTi
			Taxi
		Reason for mode	Reason to take MyCiTi
		Travel time	