

## **Towards Safe, Inclusive and Sustainable Public Transport Solutions in Namibia**

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### **Abstract**

The 1992 Earth Summit initially recognised the role of Transport in achieving Sustainable Development and was later fortified in its subsequent document – Agenda 21. Sustainable Transport is a catalyst in achieving economic growth and improving accessibility. Transport is the centre of growth and development and Sustainable Transport is a means of achieving a balance between better integration of the economy and environmental protection. Public transport in general plays an important role in the lives of people around the world, with its significance visible through the influence it has on access to employment, healthcare, education and development. The taxi industry in Namibia, considered structurally situated within the informal economy due to activities largely described as informal and unregulated, forms vital linkages between the formal and informal sectors. There is in fact a juxtaposition in the taxi industry in Namibia. On one hand, the industry faces immense scrutiny from captive users due to its unreliable, unsafe and costly operating systems. These challenges illustrate the disconnection that exists, and how road users are affected on the network. On the other hand, the taxi industry substantially addresses the issue of unemployment and accessibility. The lack of adequate infrastructure in informal settlements means that the masses do not have easy access to the municipal bus services, and as such, the problem that Namibia currently faces, as do many other developing countries is how to achieve and maintain a healthy balance between retaining the economic and social benefits of all stakeholders involved in the taxi industry and making transport more sustainable.

Sustainable transport is a challenge for many countries, particularly the least developed and developing countries. It poses a substantial number of challenges that would require creative leadership based on stakeholder involvement, particularly due to contradictory processes on the different levels of formalisation. Would achieving safe, sustainable and inclusive public transport require a synthesis between the taxi and municipal bus industries or could the two systems sustainably complement each other? In exploring transformational solutions for the Namibian case, the study focused on the extreme user and how their implied costs of using the existing public transport system can be mitigated. The study covers both qualitative and quantitative data through information collected through interviews recommends a holistic approach in providing possible solutions to create an efficient, effective and adequate public transport system.

**Keywords:** Sustainable Transport, Public Transport, Accessibility, Safety, Transport Formalisation

### **1. Introduction**

The 2030 agenda for sustainable development includes a specific goal (Sustainable Development Goal 11.2) aimed at addressing access to safe, affordable, accessible and sustainable transport systems, notably expanding public transport (International Association of Public Transport 2019). Transportation is a vital component in the provision of access to job markets, education and a host of other vital services that contribute to the social and sustainable economic growth. Sustainable transport is defined as meeting the current transport and mobility needs without compromising the ability of future generations to meet these needs. Notably promoting equity within and between successive generations through

safely realising the basic access and development needs of current and future generations (United Nation 2013).

In 30 years of the new dispensation in Namibia, the public transport industry has come under immense scrutiny as captive users face unreliable, unsafe and costly systems. A Namibian Road Safety Project survey carried out in 2019 on road safety perceptions and attitudes found that almost half of all the participants in the six study areas use public transport, with Windhoek accounting for the highest (24%) portion of all public transport users in the study areas (Ambunda and Sinclair 2020). The taxi industry in Windhoek contributes to approximately 90% of all public transport (Martinussen 2019). A number of improved settlement policies have been introduced in Windhoek in the post-colonial period. However, segregationally shaped settlement patterns largely remain unchanged. A large number of the workforce which resides on the outskirts of towns still travel long distances to access the job market, health and other vital services.

As such, the taxi industry identified an opportunity to address the transportation needs of the growing urban community. The industry has grown exponentially over the years with little effort to regulate, formalise and accommodate its growth (Kgatjepe and Ogra 2016). The taxi industry, serving a significant (90%) portion of public transport demand, has developed into a direct competitor to public transport services (Municipality busses), which are wholly subsidised by the city and government.

As Windhoek moves towards more sustainable, safe and inclusive public transport services and land uses, it is faced with a dilemma of a seemingly chaotic and inadequately regulated taxi industry that provides more coverage and mobility to a large portion of the inhabitants (Madejski, Amushila, and Kulatau 2014). This has relegated the municipality run public transport system to second fiddle, due to less coverage and limited supply. Taxis, as the most visible form of public transport in Windhoek, will generally play a major role in developing an equitable, safe and sustainable public transport system (Martinussen 2019).

## **2. Background**

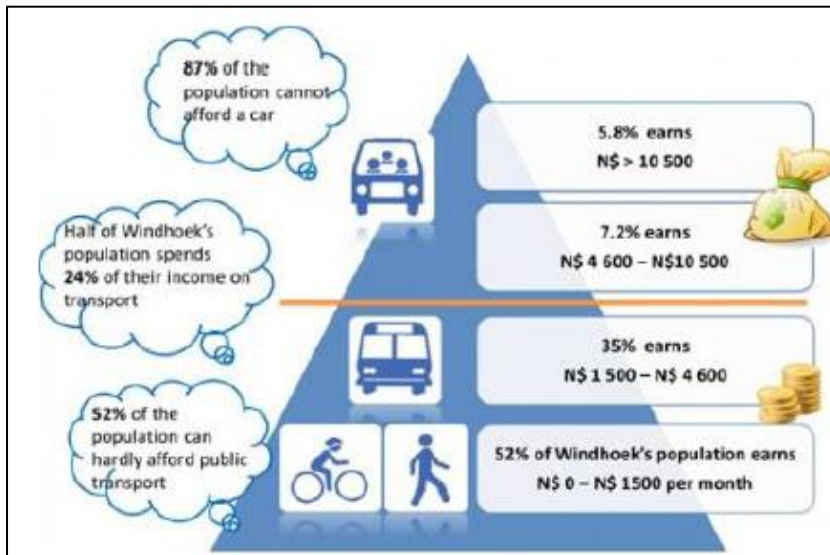
In developing countries, taxis are some of the major and prevailing modes of public transport for most commuters in urban areas. Mobility in Windhoek is characterised by low-occupancy four-seater sedans used by taxi operators and private individuals. As a key employer in the public transport sector, with 6 000 registered taxis (Martinussen 2019). Taxi operators and owners are key stakeholders with vested interests in any attempt to formalise and integrate taxis into a formal public transport system (Sekhonyane and Dugard 2016).

The taxi industry in Windhoek has always been perceived as an unregulated and volatile industry, with one of the major challenges being the low level of organisation and transparency and the high level of unregistered taxis offering their services illegally (Martinussen 2019). It is considered informal because the majority of the taxi businesses are run as “individuals” with no tax obligations and unregulated fees (Kgatjepe and Ogra 2016). Moreover, most taxi owners do not comply with labour legislations as the operators are not registered. The poor management and regulation of the taxi industry has created a de facto deregulated environment and a legacy sector that has proved very difficult to transform (Nkambule and Govender 2014).

Although, taxi operators and owners are not formally organised administratively, they form part of associations, such as the Namibian Bus and Taxi Association (NABTA) and the Namibian Transport and Taxi Union (NTTU) (GIZ 2013). These organisations handle issues ranging from membership and fare determination, hardly in consultation with members of the public.

Taxis in Windhoek are readily accessible. The seating capacity relative to demand is approximately at 76 seats per thousand residents, which is more than double the average (31)

in most African cities. Contrary, the fares range from N\$12 to N\$36 per trip if there is a taxi rank at the destination and double if the destination has no taxi rank. These fares are more than three times the average fare (N\$4.70) in African cities (GIZ 2013). Despite reasonable accessibility, the lack of a regulatory body has led to an oversupply in profitable areas, traffic congestion and a general sense of dissatisfaction among users with the high level of poor service, unpredictability and high fares (Madejski, Amushila, and Kulatau 2014). In the current public transport environment, the high fares and a lack of public transport options have disadvantaged 52% of low-income inhabitants in Windhoek, who can hardly afford public transport as it takes up more than half their monthly income (See **Figure 1**) (Martinussen 2019).



**Figure 1** Affordability of public transport by respondents

The city of Windhoek has over the years operated a public transport bus service. Despite being more affordable compared to taxis, the service is limited, operating only during peak hours from Monday to Friday. In addition, the current fleet is still insufficient to satisfy the peak hour demand, which is then filled by the taxis. The poor coverage and poor vehicle condition have also reduced its usage (68% usage of 79 buses), as it is not sufficient for inhabitants that need a more reliable and frequent “door to door” service throughout the day (Martinussen 2019). Moreover, the travel times for the bus services are incredibly high due to shared lanes with other transport modes (See **Figure 2**).



**Figure 2** Windhoek Municipal Bus in traffic during morning peak hour (Martinussen 2019)

Therefore, an exploratory study was conducted through interviews to investigate the perception of taxi operators and users on the taxi industry and municipal bus system, and how to ascertain best practices that achieve a more efficient, safe and sustainable public transport system.

### 3. Method

A qualitative approach was applied in the study. Firstly, the study used the 6 000 registered taxis (assumed to be representative of operators and users) as the study target sample. In order to determine whether the 6 000 representatives of operators and users were sufficient to draw inferences on the study populations, a minimum required sample size was calculated using the statistical power analysis.

Statistical power analysis deals with a type II error, estimating the power as  $1-\beta$  as illustrated in **Table 1**. The analysis can be interpreted as the probability that a statistical test will correctly reject a null hypothesis. The maximum acceptable p value of a type II error should be 20% (0.2), implying that to detect reasonable effects, the power of a statistical test should be at least 80% (0.8).

**Table 1** Sample testing using statistical power analysis

Test decision	True state of population	
	Effect absent $H_0$ is true	Effect present $H_0$ is false
Test result: $p < \alpha$ Test decision: reject $H_0$ Conclusion: "effect exists"	Type I error $p = \alpha^i$	Power $p = 1 - \beta$
Test result: $p \geq \alpha$ Test decision: accept $H_0$ Conclusion: "effect absent"	Correct decision $p = 1 - \alpha$	Type II error $p = \beta^{ii}$

The statistical power analysis was applied in STATISTICA. The  $\alpha$ -level was set at 0.05 with a desired power of 80% of detecting a statistical effect. The analysis determined the minimum sample size as 1 064 as indicated in **Table 2**.

**Table 2** Statistical power analysis results

	Sample Size Calculation One Proportion, Z, Chi-Square Test $H_0: P_i = P_{i0}$
	Value
<b>Null Proportion (<math>P_{i0}</math>)</b>	0.5000
<b>Population Proportion (<math>P_i</math>)</b>	0.4299
<b>Alpha (Nominal)</b>	0.0500
<b>Actual Alpha (Exact)</b>	0.0502
<b>Power Goal</b>	0.8000
<b>Actual Power (Normal Approx.)</b>	0.7997
<b>Actual Power (Exact)</b>	0.8100
<b>Required Sample Size (N)</b>	<b>1 064</b>

Secondly, interviews and questionnaires were distributed to operators and commuters in Windhoek by the researcher (see **Figure 3**). A total of one thousand and eighty (1 080) completed questionnaires and interviews were used to compile the data and for the analysis. The survey was carried out in November 2019, during the morning and afternoon peak hours. The respondents were asked about their perceptions, attitudes and opinions towards the taxi industry, municipal operated bus service and the possible integration of both public transport services to create a much more sustainable, safe and equitable public transport.

<sup>i</sup>  $\alpha$  is the probability ( $p$ ) of a type I error, which rejects the null hypothesis ( $H_0$ ) when true

<sup>ii</sup>  $\beta$  is the probability of a type II error, which fails to reject the null hypothesis ( $H_0$ ) when false



Figure 3 Survey in Windhoek 2019

#### 4. Results

An overwhelming majority (88%) of the respondents stated that they use a taxi every day for work, school or shopping purposes, compared to slightly more than a tenth (12%) that use the municipal operated bus services to access similar services (see Figure 4).

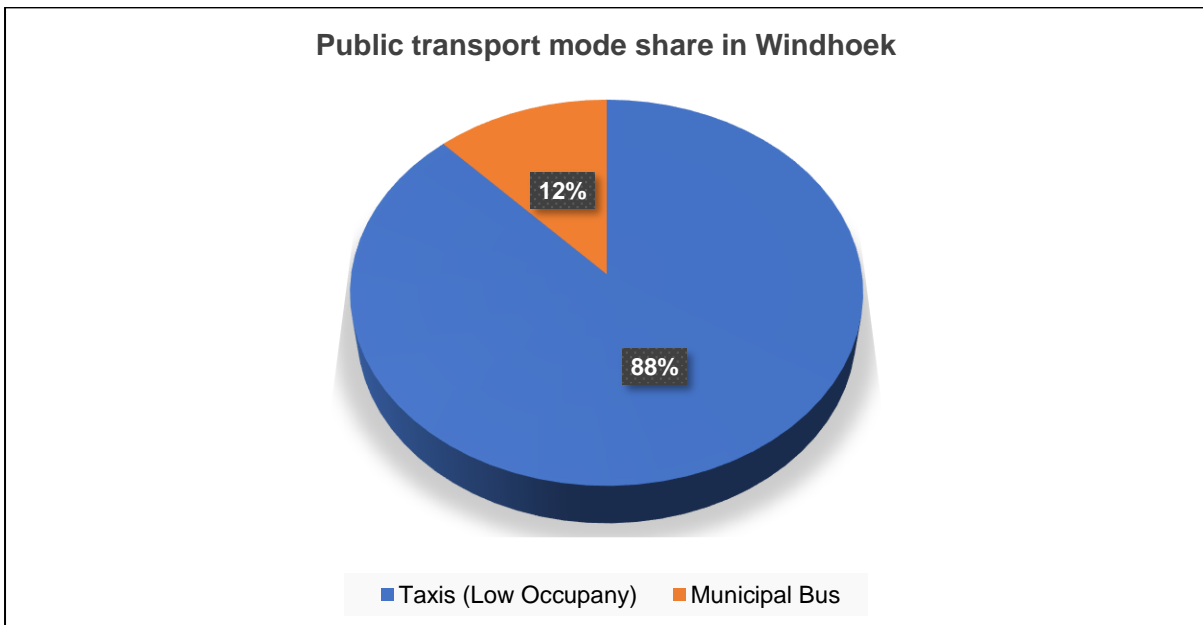
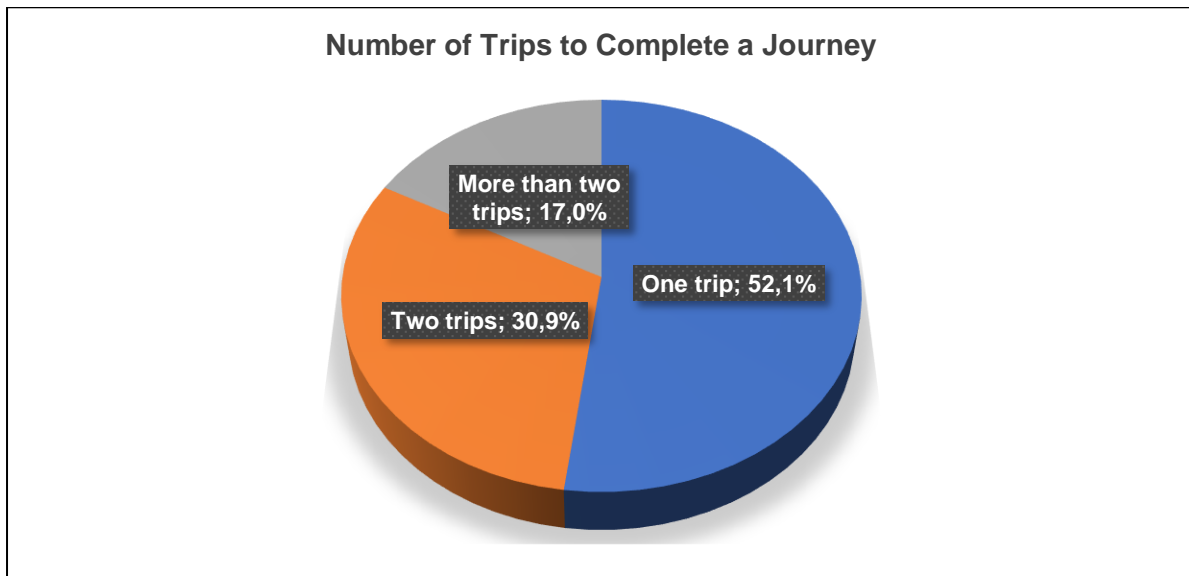


Figure 4 Public transport mode share in Windhoek

During peak hours, majority (92.4%) of the participants mentioned that they take on average forty-five (45) minutes to reach their destination when using taxis and less than 20 minutes during off-peak hours. When using the municipal bus services during peak hours, respondents mentioned that they take on average one (1) hour to reach their destination. No municipal bus service is provided during off-peak hours. All the respondents using the municipal bus service aired their frustration at the high travel times endured when using the service.

All the participants indicated that they pay their taxi and bus fares in cash. However, a third of the respondents (33%) stated that they would prefer monthly tickets for budgeting purposes. Slightly more than two fifths (42.4%) stated they would prefer to use their bank cards through smart card technology (Minimise cash handling) while slightly less than a quarter (24.6%) preferred cash payments.

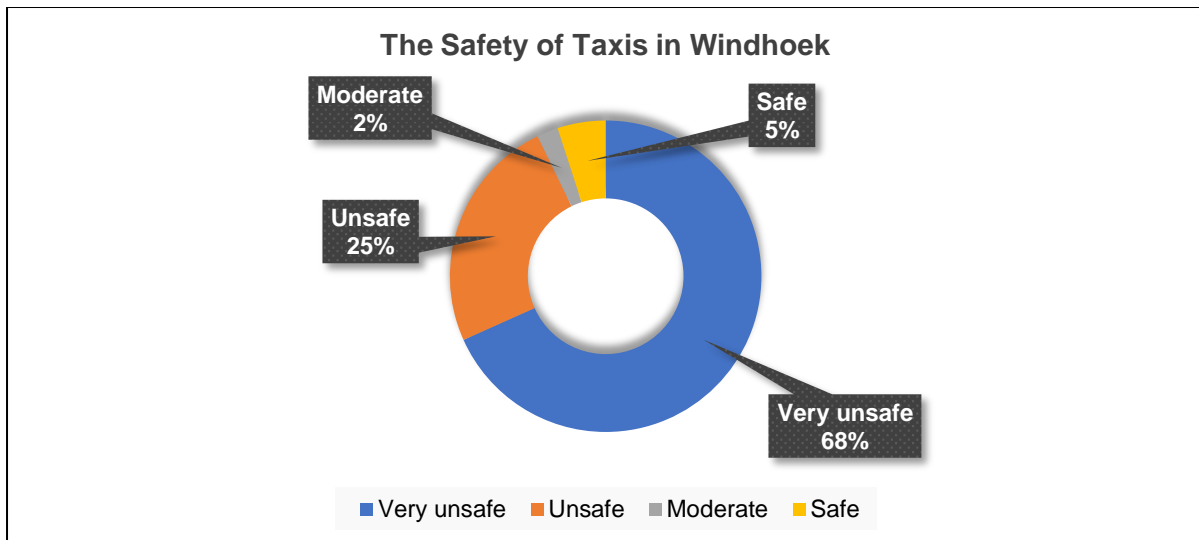
The study found that slightly more than half (52.1%) of the respondents normally make one trip to complete their journey. Slightly less than a third (30.9%) take two trips to complete their journey. While, slightly more than a sixth (17%) of the respondents mentioned that they take more than three trips (see **Figure 5**).



**Figure 5** Number of trips respondents make to complete a journey

An overwhelming majority (89.6%) preferred taxis due to a high coverage and availability. However, more than a third (70%) of the respondents mentioned that they would use other modes of public transport if similar coverage and accessibility was available, due to high taxi fares. Although the taxi coverage was well acknowledged, almost half (47.2%) of the respondents noted that operators hardly provided any service to areas with poor infrastructure, requiring users in such areas to walk long distances before they can access any public transport services.

A vast majority (83.1%) of the respondents using taxis noted with dismay the poor service (unfriendly) provided by taxi operators, compared to all municipal bus users acknowledging great service from bus operators. Similar, the safety (very unsafe or unsafe) of the taxis was alarmingly raised by majority (93%) of the respondents using taxis, with some respondents reporting that they have had encounters with unruly operators and thieves while on board a taxi (see **Figure 6**). Moreover, both operators and respondents using taxis noted the alarmingly high number of unregistered taxis operating in the city. Which charge irregular fees and are used to carry out crimes as they are largely untraceable. As a consequence, tarnishing the image of the industry all together. All respondents using the municipal bus services noted that safety was less of an issue while using the service.



**Figure 6** Respondents perception taxi safety in Windhoek

A majority (75.9%) of the respondents responded “Yes” when asked if they would use the municipal bus service if it was made regular, coverage was improved and a dedicated lane was provided to this service. Slightly less than a quarter (24.1%) of the respondents noted that they would still use taxis due to their “door to door” service and they would not have to wait around at the bus stations for scheduled buses.

98.3% the participants highlighted the importance of stakeholder consultation in the process of developing a sustainable, safe, affordable and integrated public transport system. 1.7% of the respondents stated that regulatory measures should be driven by the government without “interference” from the stakeholders (Operators, owners, users).

## 5. Conclusion and recommendations

The case study has revealed the juxtaposition in the taxi industry and the opportunity that exists to integrate the two-public transport (PT) services offered by individual operators and the Windhoek Municipality. The taxi industry delivers a vital service in providing coverage and a readily available mode of transport in the city, filling the gap left by the less accessible municipal bus service. Despite the lack of safety and high fares by taxis, the study has found that that users are willing to endure the poor service due to high availability and the appealing door to door service offered by the taxis. The study has brought to the fore the importance of finding a balance between affordability, safety and proper service delivery in the public transport industry.

Due to a lack of monitoring and regulation over the years, the public transport system has shown signs of over-saturation in Windhoek (Martinussen 2019), which has resulted in the ineffectiveness of the road infrastructure and has created a safety and sustainability problem for public transport stakeholders. Therefore, a comprehensive regulatory frame work and policy direction is long overdue from all stakeholder involved to negate the effects of the lack of administrative structure and formally integrate taxis with the bus service offered by the municipality.

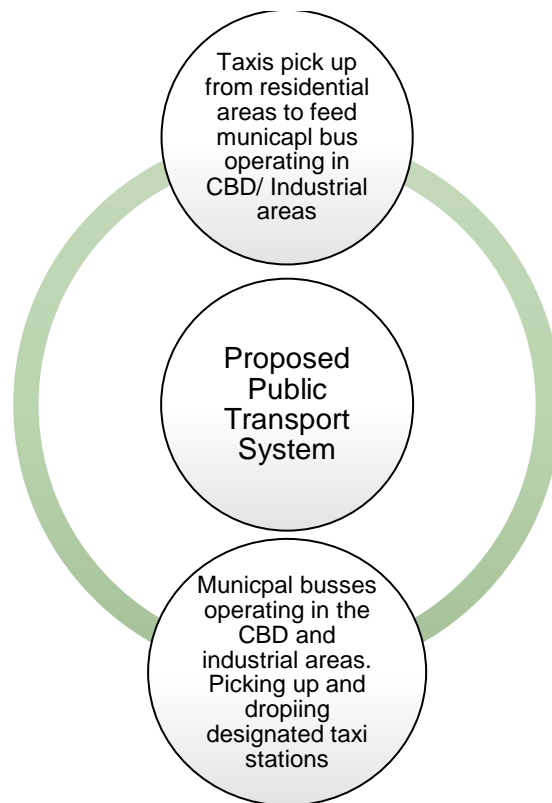
To provide effective, affordable, safe and sustainable transport for the city of Windhoek, it is imperative to design and implement policies aligned with the “Avoid-Shift- Improve” guidelines based on integrated institutions, stakeholder consultations, enhanced governance and short-and long-term planning accounting for the economics of sustainable transport, capacity building and monitoring and evaluating systems put in place.

The taxi industry and officials in the municipality/ government need to work in concert to plan and develop policies that integrate taxi operators into the formal industry. By creating an

intermodal public transport chain system (Busses and taxis (Low-occupancy vehicles)) integrated to meet the needs of the various users, the system substantially improves its efficiency and growth potential (Puri 2017). A regulated taxi industry also helps to address the problem of large scores of unregistered taxis invading the market and over-saturating the profit areas.

Incorporating the formal and informal sector to create a seamless corridor of intermodal links will effectively help improve user choice and satisfaction. It is vital to makes users feel prioritised regardless of the different activities they partake in. This will also aid the city to address the vicious cycle of car-centric development, that has led to road infrastructure deterioration, traffic congestion and poor land use choices, through improved accessibility for all public transport modes, regardless of demographic characteristics. The modal shift realities due to discouraging private car use will result in considerable positive changes in general traffic performance and behaviour, with a notable operational speed increase and reduced time delays.

Creating a feeder public transport system (see **Figure 7**) where the two PT modes operate in tandem on different parts of the network, seamlessly feeding each other while maintaining the proximity to origin and destination points (particularly during the peak-hours) for all users will be a strong determinant for the sustainable integration and success of the PT system. The system must be set up to reduce the number of trips that a user has to take to complete a journey, as this is counterproductive in addressing the current public transport system. Importantly, the PT system should be supported by stringent policies, regulations and marketing drive aimed towards reducing private car usage in the city and increasing municipal busses (High occupancy vehicles) usage, while taking advantage of the coverage provided by the taxis (low occupancy vehicles).



**Figure 7** Proposed public transport system



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