

# Chapter One

## Introduction

### 1.1 Introduction

This research looks at the effect of public transport system on poverty. The overall aim is to draw lessons, on the relationship between poverty and accessibility, from other cities in the developing countries that introduced public transport in their transportation systems. These lessons will be useful for Johannesburg that is in the process of introducing an integrated public transportation system (through a Bus Rapid Transit System) and wanting to include the poor in its developments.

Chapter one is structured as follows: it begins by giving the background of the research. It then goes on to state the broader aim and the specific objectives of the study. This is followed by the rationale and the problem statement section. The chapter then goes on to set the parameters of the study i.e. the scope. This is then followed by a section on the research question (that guides this study). The research methodology forms the second last section of the chapter. The last section under this chapter is a brief description of how the rest of the research report is structured.

### 1.2 Background

“In 1990, only one in ten people lived in cities but today half of the world population – well over 2900 million people live in urban areas. Already, 19 cities - 15 of them in the developing world – have population exceeding 10 million” (UNCHS- Habitat 2001:114). These figures show the alarming rate of urbanisation in the world and of interest is that much of this urbanisation is happening in third world countries. Sadly, this urbanisation is basically urbanisation of poverty in the sense that the majority of urban population growth is a growth in the number of poor people (*ibid*).

Although this urbanisation of poverty is dominant in third world countries, according to the World Bank, it is mostly pronounced in Sub-Saharan Africa (White and Killick,

2001). For example there is a high percentage of people living below the poverty line of US\$1 per day per person in Sub-Saharan Africa as compared to other developing parts of the world (ibid).

Since rural-urban migration is a common phenomenon in Sub-Saharan Africa, the question then is how can these migrants better their lives with no or very little income? To make matters worse, city authorities who mainly depend on rates and rents from citizens to provide infrastructure, goods and services are also struggling to do so given the fact that most of the poor are not contributing anything towards this cause. This means something has to be done to balance this complicated situation.

One of the areas that need to be taken into consideration is that this growing of cities, which happens in a low density fashion leading to urban sprawl, has a number of negative effects especially on the poor. For example in Gauteng province, urban sprawl that is caused partially by location of subsidised low-income housing projects on low value land on the urban edge has seen long travelling distances (which means more time spent travelling instead of doing productive things) as well as high transportation costs which are in most cases beyond the reach of many poor people (A Strategic Agenda for Transport in Gauteng, 2005). According to the National Travel Survey (preliminary results of 2004), 18% of households in Gauteng province (480 000 households) spend more than 20% of their income on public transport instead of the national strategic objective figure of 10% (ibid). One possible explanation for these high figures is because passengers use more than one mode of transport or taxis for a single journey. This situation leaves the poor worse-off financially because they end up paying more than what is necessary.

The other problem associated with the urban periphery is that it is remote and has less access to facilities in most cases. Studies carried out in Ghana proved that there is a strong correlation between mean income (which in most cases determines where one has to stay –location) and access to facilities such as drivable roads (White and Killick, 2001). This Ghanaian study found that poorer regions have greater proportions of their population without access to a proper drivable road or public transport (ibid). This is also true for most cities in the Sub-Saharan Africa region. Most roads on the periphery (where most informal settlements are) are poorly maintained gravel roads and therefore

discourage enough operators to ply such routes (A Strategic Agenda for Transport in Gauteng, 2005).

Other problems that are likely to leave the poor worse-off in terms of a public transportation system in developing countries are: complete absence of the transportation system, unreliability and slow schedules (Owen, 1966). Unlike in developed countries like Britain where there is a reliable public transportation system, most third world countries are still struggling to deliver as per their customers' expectation. There is not a facility to inform the traveller when the next bus or taxi is coming if it is coming at all. This means travellers have to end up wasting a lot of time (one of the scarce and precious resource) waiting for a service they do not know whether it is coming or not.

An increase in the middle class especially in post apartheid South Africa saw an increase in the number of vehicles/cars on the streets and highways. This has led to congestion, not to mention pollution from exhaust fumes (Iles, 2005). Despite the fact that there is an increase in the number of private cars on the roads, the number of people also requiring public transport is increasing. This problem of increasing demand for public transport would be even "greater if it were not for the fact that low disposable incomes prevent many workers from making regular use of public transport" (Roth 1984 cited in Turton and Knowles, 1992: 84). This shortage of public transport in most third world countries is as a result of a declining fleet (buses and taxis) because of a shortage of finance to replace worn-out vehicles (Iles, 2005). For example, in India a lack of foreign currency to purchase spare parts and new buses as well as the shortage of skilled labour to maintain buses results in between 60 and 80% of the buses being out of service, which leaves many of the travellers stranded (Dimitriou, 1990b cited in Turton and Knowles, 1992). This situation leaves the poor worse-off who have to travel long distances from home to work using poor public transport.

In order to reduce poverty levels in developing countries, economic growth must be inclusive growth (i.e. benefit the rich and the poor) (White and Killick, 2001). White and Killick (2001) went further to point out that the extent of the poor's participation in economic activities and their physical access to markets determine the impact of growth on the poor. One way of ensuring physical access to various places is by providing a good public transportation system. The city of Johannesburg that has an unemployment rate of

27% (which means more people living in poverty if those with very low wages are added) (Stats SA, 2001), wants to promote the use of public transport. One of the reasons behind this move is to better the lives of the poor by implementing the twelve sector plans, which include transportation, in the Johannesburg Growth and Development Strategy (GDS) (2006) namely: economic development, human and community development, housing, infrastructure and basic services, environment, spatial forms and urban management, ***transportation***, health, safety, financial sustainability, governance, corporate and shared services. Refer to chapter five of the GDS for more detailed information. One of the overall aims of the GDS is to lower poverty levels as it clearly says: “The city of Johannesburg will not plan on the basis that the poor, vulnerable and excluded will eventually go somewhere else. It will proactively help new households, new internal and circular migrants, those in hostels, informal settlements and historical ghettos, unemployed youth, refugees and others negotiate access to the city and get onto the ladder of urban prosperity” (Johannesburg GDS, 2006: 52). This statement suggests that the City is planning with the transport-deprived groups in mind. “These groups within the urban community who experience an acceptable level of mobility and accessibility difficulty to essential daily or periodic facilities include ..... the elderly, the sick and disabled, those on very low incomes and those below the legal driving age” (Turton and Knowles, 1992: 84). Public transport in this case is a “means to increase accessibility of opportunities to all city users” (Johannesburg SDF, 2006: 43).

It is against this background that the research seeks to explore the effect an efficient public transport system is likely to have on the city’s poverty levels. This will be done by drawing lessons from international experience e.g. South American cities like the city of Bogotá in Colombia and Curitiba in Brazil that took almost a similar route.

## **1.3 Aim and Objectives**

### **1.3.1 Aim**

The study seeks:

To critically examine the effect of an efficient public transport system on poverty levels.

### **1.3.2 Objectives**

1. To establish the relationship between a city’s movement system and its poverty levels.

2. To investigate what constitutes an efficient public transport system.
3. To unpack what poverty is.
4. To highlight factors/conditions that need to work hand in hand with an efficient public transport system in order to reduce poverty levels at city level.

## **1.4 Rationale and Problem Statement**

Johannesburg is planning along the lines of encouraging people to use public transport compared to private cars. For example, the government (both central and local) channelled a lot of money towards the Gautrain and there are also plans to implement a Bus Rapid Transit System. All these are efforts to promote the use of public transport. The author feels that there is a need for a study that explores the likely consequences of such a move, hence this research.

Just like any third world city, the city of Johannesburg has high poverty levels as has already been discussed above. This research therefore aims to explore ways/measures that Johannesburg has to take in order to lower its poverty levels.

In Johannesburg, 34 % of the population rely on public transport (taxi, bus and train) to go to school or work (City of Johannesburg SDF 2006/7). Assuming that an efficient public transportation system coupled with other measures lowers poverty levels, the question then is why are poverty levels not going down considering the high usage of public transport in the city? This study will explore this issue basing on the theories of social exclusion, sustainability and the role of the state (to be discussed in chapter 3)

## **1.5 Scope of Study**

There are quite a number of modes of public transport. These include: rail, road, water, air, etc. This research will only concentrate on road-based public transport. The author is fully aware that rail is an important mode of public transport especially in Johannesburg where there is an existing over-ground and a proposed under-ground (Gautrain) system. However, due to the limited time available, it is not possible to discuss the rail system in detail; hence the decision to concentrate on the road-based system only. Bogotá and Curitiba did not have a rail system in their public transportation system (Schwartz, 2004). This is another reason why the author decided to concentrate on the road system only.

Water and air modes of transport are out of the question because they are mainly used between cities and this study concentrates on public transport within a city.

Although it makes more sense to talk about Greater Johannesburg instead of the city of Johannesburg due to inter-linkages between the metropolitans that make-up the province. Due to time constraints, this research will only concentrate on the City of Johannesburg. This will reduce the amount of data to be gathered and analysed.

Poverty is a broad term that encompasses a lot of things. Again due to limited resources, this research will mainly concentrate on measures based on income or consumption that are easy to measure and that have readily available data (White and Killick, 2001).

However, other areas of poverty will be discussed briefly also.

The author is again fully aware of the fact that a public transportation system cannot reduce poverty levels on its own. There are other strategies and conditions that need to work hand in hand with it in order to see positive results. Due to time constraints this research will only concentrate on public transport and discuss, but not in detail, the other conditions/strategies in the last chapter. Such issues include democracy and public participation, the role of the state etc.

Bogotá is the main case study because Johannesburg's Bus Rapid Transit system (BRT) is based on this city's model. However, it is important to note that Bogotá's model is also based on other cities' models, the main one being Curitiba (Montezuma, 2005). The author therefore feels that it is important to pick some lessons here and there from Curitiba since it is one of the cities that implemented a BRT system that is used as a model by many cities today. However, due to time constraints, Curitiba's public transportation system will not be explored in detail, but the research will only draw lessons from this city.

## **1.6 Research Question**

The research will answer, through an exploration and analysis of international experience, the following specific research question:

What is the effect of an efficient public transportation system on poverty levels?

## **1.7 Research Method**

The first part of the research is a literature review on the debates around accessibility and poverty. This part explains the meaning of an efficient public transport system. Poverty and poverty levels as they will be used in this research are also explained in this part.

The second part is a case study review of Bogotá and Johannesburg's public transportation systems. This is a single case (comparative) exploratory research that draws lessons mainly from Bogotá. This research relied solely on secondary data from both published and unpublished material. It is important to note that there wasn't a specific scientific method that was used to choose the main case study in question (Bogotá), save for the fact that Johannesburg's proposed BRT system is based on this city's model.

Bogotá, Colombia was also chosen on the basis that it has a lot of similarities to Johannesburg, South Africa and some of these include:

1. Both are in developing countries or low to medium income countries so to speak, hence a relatively high population percentage of poor people.
2. Both cities have almost similar spatial characteristics, with the poorest areas located on the city periphery.
3. Public transport and walking are the main two travel modes in both cities. For example 44% and 31% of the population used public buses and walked respectively in Bogotá in 1995 (Cain, Darido, Baltes, Rodriguez and Barrios, 2006). In Johannesburg, 34% and 32% of the population use public transport and walk to work or school respectively (City of Johannesburg SDF, 2006/7).
4. Both cities have a public transport system based on a corridor system. Bogotá has two trunk corridors that are operating presently and Johannesburg has two major corridors, the North-South and East-West transit corridors.
5. At present Bogotá's transportation system is made up of complementary services that include the feeder lines and trunk routes. Johannesburg is also planning to have a complementary system of taxis and buses as well as the rail system.
6. The traditional public transportation system of Bogotá was unreliable and unsafe so as present Johannesburg's public transportation system. (In this research, please note that

- the pre-Transmilenio system is also referred to as Bogotá's traditional public transportation system).
7. The traditional public transportation system of Bogotá did not pay much attention to low potential revenue areas; so as present Johannesburg's informal settlements and other low potential revenue areas which receive a poor transportation service.
  8. In both countries, the national government is responsible for setting broad policies and defining the general framework for the urban transport system and Local governments are responsible for planning the urban transport system and for actual service provision. For example in Colombia, the Constitution and other legislations give responsibilities for planning and service provision between central and municipal levels of government (Adila, 2005). For South Africa, refer to section 43 of the 1996 Constitution of the Republic of South Africa.
  9. In Bogotá, the Bus Rapid Transit (BRT) system is not subsidized by the government and the initiative is a Public Private Partnership (PPP). This is the same approach that Johannesburg wants to implement whereby its BRT system will be a PPP and not subsidized by the government.
  10. City sizes are almost the same. For example Bogotá had a metropolitan and city population of 7,881,156 and 6, 778, 691 respectively in 2005 (<http://en.wikipedia.org/wiki/Bogot%C3%A1>) and Johannesburg had a metropolitan and city population of approximately 8 million and 3, 225, 812 respectively in 2001 (StatSA, 2001).

This research explores the relationship between accessibility and poverty. This was achieved by doing the following but not exactly in that order:

1. A comparison between Bogotá's traditional public transport system and that of present Johannesburg was made.
2. Bogotá's poverty levels before the Transmilenio and present Johannesburg's poverty levels were also compared.
3. The research explored how Bogotá's traditional public transportation system worked and how the Transmilenio is working.
4. The study also looked into what the Transmilenio did in terms of poverty reduction
5. In order to establish whether Johannesburg's transport system is going to achieve what Bogotá achieved, the research explored the conditions in Johannesburg and those that existed in Bogotá then. These conditions include the notion of democracy,

capacity, public participation etc. The research also went further to explore the actual implementation (e.g. costs, frequency of service, fare collection method etc) of the Bus Rapid Transit System in Bogotá

Information gained through this research is purely theoretical and will be very useful for the city of Johannesburg that wants to balance the equation of adopting an efficient public transportation system versus proactively including the poor in its developments (social inclusion).

## **1.8 Structure of the Research Report**

The research is divided into eight chapters. The first chapter is the introductory chapter that has already been described above. This is followed by the literature review chapter that looks at the literature available on transport and poverty.

Chapter three discusses the three conceptual/ theoretical frameworks within which the research is located. It unpacks the debates around poverty and accessibility. Chapter four is a contextual chapter. It describes the cities in question i.e. Johannesburg and Bogotá.

Chapter five describes the traditional Bogotá and present Johannesburg public transport findings. Bogotá's new transportation model and proposed Johannesburg's public transportation systems are discussed in chapter six. Chapter seven analyses the research findings and finally chapter eight gives recommendations and concludes the research.

# Chapter Two

## Literature Review

### 2.1 Introduction

This chapter reviews the literature available with regard to passenger public transport and poverty. It starts by unpacking the meaning of an efficient public transportation system. It then goes on to highlight the passenger transportation system in general and then narrows it to the road-based system. Components of the road based system are also discussed in this chapter. The last section of the chapter unpacks the meaning of poverty and its causes.

### 2.2 What is an Efficient Public Transportation System?

According to Wells (1975) public transport, as compared to more flexible private cars, is a more efficient means of transporting big numbers of people in urban areas. Its main objective is to provide a good service to the public. Now that we know that public transport is an efficient means of transporting people, it is important to unpack the meaning behind the phrase - an efficient public transportation system. The Johannesburg SDF (2006) defined an efficient public transportation system as a highly accessible movement system that supports a range of modes and activities at various levels, intensity and scale. According to Owen (1966: 6), an efficient public transport system is always available, it is reliable, has reasonable fares (low cost), does not have “slow schedules, and high rates of damage and pilferage”. In addition to the above list, A Strategic Agenda for Transport in Gauteng (2005) has a long list of what it argues an efficient public transportation system to be. Some of these aspects include:

- travel times: “commuting times should not exceed an hour in each direction” (A Strategic Agenda for Transport in Gauteng, 2005: 19).
- quality public transport vehicles: modern buses with low floors and more doors so that passengers can alight and delight more quickly and easily.
- quality service: fixed routes, an integrated ticketing system which offers tickets that can be used on different modes in an integrated network. A good example is the

London public transportation system that has a travel card that can be used between different modes of public transport (bus, over-ground and under-ground rail). A quality service has enough information for passengers.

- street furniture: e.g. sheltered bus stops to protect travellers from harsh weather
- safety: less accidents on the roads and low levels of crime

In short, the above information suggests that an efficient public transportation system improves the quality of life of city residents since it enables people to “get to key services at reasonable cost, in reasonable time and with reasonable ease” (Making the Connections: Final Report on Transport and Social Exclusion Summary 2002:2).

This line of argument is supported by scholars like Owen (1966:1) who argues that “not that transport alone is the key to progress ..... but is a necessary ingredient of nearly every aspect of economic and social development. It plays a key role in getting land into production ..... in the development of industry ..... in the conduct of health and education programmes and in the exchange of ideas”. In order for different sectors of the economy to prosper and create jobs, there is need for a good transportation system (Simpson 1987). For less-developed parts of the world to develop, there is need for a good transport system to be in place (Hoyle 1973 in Hoyle and Knowles, 1992). Therefore “transport is the heartbeat of the economy so it is important that we get it right” (Jacobs – the Gauteng Public Transport, Roads and Works MEC, 2005: 1).

## **2.3 Passenger Transportation System**

There are a number of systems within which the passenger transportation operates and interacts. These are the economic, physical and regulatory systems (Farris and Harding, 1976).

### **2.3.1 The economic system**

Of particular interest within the economic system is the cost component(s) aspect. This includes cost of labour, maintenance and capital costs (Haefner, 1986). In order for passenger transport to operate there has to be employees, vehicles and these vehicles have to be maintained. All these call for good money so one has to consider all these costs when talking about passenger transport.

### **2.3.2 Regulatory system**

Regulatory is another system within which passenger transportation operates and interacts. Its two main goals are to protect the public and promote the best possible passenger transportation system (Farris and Harding, 1976). Although it is a very broad term and has several meanings, this research will only concentrate on three view points of regulation, that are relevant to this study, that were identified by Farris and Harding (1976). These are economic regulation, regulation of the physical aspects of transportation and regulation by social policy.

**Economic regulation:** this has three aspects namely control of prices that for-hire carriers charge, control of entry of new carriers and the change in the operating structure of existing carriers and control over the level of service of the carriers (ibid). Control of new and existing carriers can be in the form of route assignment. Most public transport vehicles have a route that they have to follow. The main reason behind routing is to make sure that the whole city is serviced because transport operators will only concentrate on routes that yield more profit and ignore those that have less returns.

Prices charged by operators have to be regulated (mostly by the government) otherwise passengers will be charged inflated prices which do not reflect the true cost. This also applies to level of service. Someone, especially the government has to keep an eye on operators to make sure that they do not provide a poor quality service that will disadvantage the public at large.

**Regulation of the physical aspects of transportation:** “These are regulations imposed on the condition of transportation, both by society as a whole and, in some instances, the industry itself” (Farris and Harding, 1976: 122). Physical regulation of transportation is found in three groups namely regulation of condition of equipment i.e. physical condition of a vehicle, regulation of qualification of operators e.g. the need for a driver’s license for drivers and regulation of operating procedures e.g. speed limit (ibid).

**Regulation by social policy:** Society has a say (therefore can regulate) in passenger public transportation operations, because it is a shareholder in the arena within which the operations take place. For example, public funds that are used to subsidise public

transport come from the society. This also applies to the environment; there is no single person who can claim the environment to be theirs, but it belongs to the society at large. Therefore society can impose environmental restraints on passenger transportation e.g. the permissible amount of pollution into the atmosphere (*ibid*). (Please note that subsidies and environment related issues i.e. sustainability are discussed in detail in chapter three).

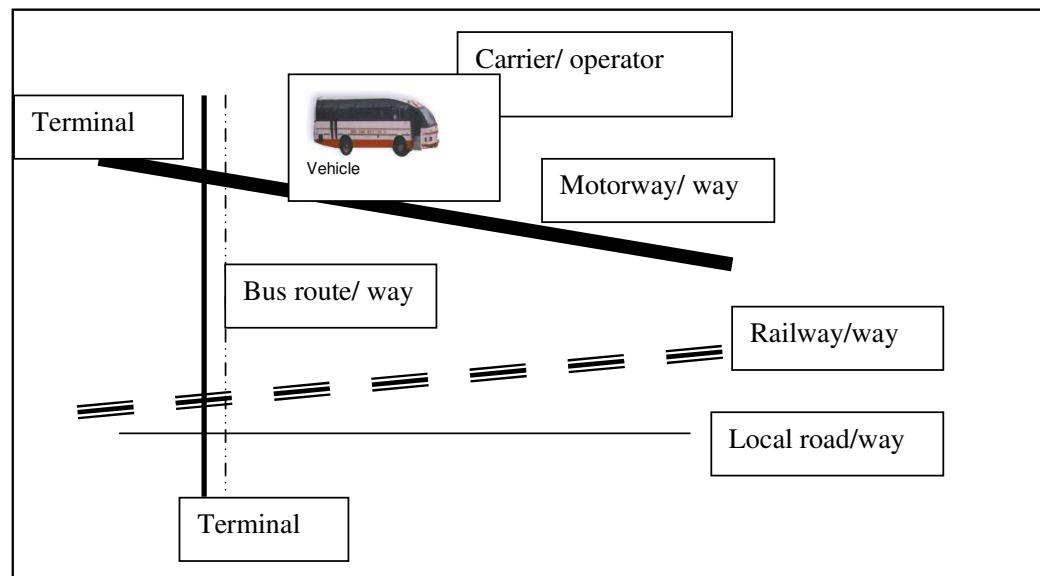
### 2.3.3 The physical system

This “occurs when one considers all modes…….. providing the total physical function of moving people” (Farris and Harding, 1976: 20). Such modes include road based, rail water and air. Any of these modes has basically four interacting components; refer to the section below for a detailed discussion of these components.

## 2.4 Components of the passenger transportation system

The physical and economic transportation systems discussed above are composed of four interacting components and these are the carriers, the way, the terminal, and the vehicle (Farris and Harding, 1976). Refer to figure 1 below. These four combine to produce an amazing amount of physical and economic activity (*ibid*).

**Figure 1: A representation of components of the passenger transportation system**



Source: author after Blunden (1971)

### **2.4.1 The carrier**

Carrier means “anyone or any organisation supplying passenger transportation” (Farris and Harding, 1976: 55).

### **2.4.2 The way**

These include the highways and streets, the railways, the airways, and the waterways as well as the seas. All these provide a path for passenger transportation and they can be either man-made (e.g. highways) or nature made (e.g. seas) (Farris and Harding, 1976). This also applies to ownership and responsibility – it (way) can either be privatively or publicly owned, operated and maintained (*ibid*). The type of ownership and responsibility for the way usually affects the fares charged by carriers. For example, fares charged by carriers operating on nature or man-made ways that are publicly owned, operated and maintained are usually cheaper as compared to those charged by carriers operating on man-made ways that are privatively owned, operated and maintained (*ibid*). This is because publicly owned, operated and maintained ways are subsidised (by public funds) in one way or another, hence they are cheaper as compared to for profit ways that are privately owned.

Regardless of whether the way is publicly or privately owned, there are basically three general types of fares that exist and these are:

- a flat fare: in this case, the fare is the same throughout the network
- fare graduated by distance travelled: the longer the journey the higher the fare
- fares geographically zoned over the network: fares change as you travel from one zone to the other (Haefner, 1986).

### **2.4.3 The terminals**

These can be found along the way, at the end or beginning of the way or even separate from the way completely (Farris and Harding, 1976). The terminal has five major functions and these are:

- concentration: bring people together to catch a vehicle for specific destinations
- dispersion: at the end of the journey
- passenger service: e.g. ticketing, telephone call boxes, banks, restaurants, offices and shops

- vehicle service: e.g. maintenance, repairs, fuelling, cleaning etc
- interchange: transfers.

Most of the terminals are man-made. Their provision and ownership usually follows the pattern of the way. For example, if the way is privately owned, the terminal will also be privately owned (*ibid*).

Coming back to one function of terminals i.e. ticketing, tickets can be prepaid i.e. those purchased from off-licence shops and stations or those that can be purchased upon boarding the vehicle. They can also be for more than one mode of transport (an integrated ticketing system discussed above) or for just one mode of transport or vehicle. We do not have an integrated ticketing system in South Africa yet.

#### **2.4.4 The vehicle**

This travels on the way between the terminals. Examples include buses, taxis, trains, aeroplanes etc.

Although the transportation system consists of a range of modes of transport and infrastructure, as was pointed out in section 1.5 (the scope), the following section will only discuss in detail the road-based modes of public transport and infrastructure. (Please note that in this research, road-based modes includes both formal and informal modes of transport that use the road for a way).

### **2.5 Modes of Road-based Public Transport**

According to Cervero (1997 cited in Banister, 2005), the urban poor need other forms of transport that are both accessible and affordable. Bus-based systems, supplemented by informal modes of transport were found to be ideal in such situations (*ibid*). This is mainly because they (bus-based systems) are cheaper to build as compared to rail and are faster and carry more people as compared to non-motorized modes of transport. However, as has already been said, informal and formal modes should complement each other to provide a better service.

Although normally slow, informal modes of transport are of great importance because they penetrate areas that formal modes cannot. Hence should not be ignored, because they

provide a service to marginalised areas and link them to the main service (formal modes). Informal modes include rickshaws used in Bangladesh (Gallagher, 1992 cited in Banister, 2005), “minibuses and bicycles used in Africa” (hook, 1995 cited in Banister, 2005: 197).

Since many developing world cities like Bogotá and Johannesburg have an informal transport sector, this section will therefore concentrate on both formal and informal road-based modes of public transport and these include: conventional buses, taxis, motorcycles, scooters, human and animal powered vehicles (Iles, 2005).

## **2.5.1 Buses**

### **2.5.1.1 Single deck buses**

Most of the buses operated in the world are single-deckers (Iles, 2005). These are usually available in a range of lengths (five to twelve metres). In some countries like Britain, buses as long as fifteen metres are allowed and these are called articulated vehicles and shall be discussed below. These require three axles as opposed to the usually two (*ibid*). Fully sized single deck buses, which are approximately twelve metres long, carry between sixty and one hundred and twenty passengers. The one hundred and twenty passengers usually include those standing (*ibid*). Single deck buses can either be low floors or not. Those with low floors are most suitable for people with special needs e.g. the disabled, mothers with pushchairs and pregnant women. Most of London buses without low floors are being phased out and being replaced by those with low floors and a wheelchair access. Both Bogotá and Johannesburg have these single-deck buses.

### **2.5.1.2 Double deck buses**

Double deck buses are usually between nine and twelve metres long although some longer than this may be found in some developed countries (Iles, 2005). These buses are extensively used in the United Kingdom and former British colonies like India and Sri Lanka (*ibid*). They are also very common in countries like South Africa. Double-deckers have a high sitting capacity within a limited space compared to single-deckers. This therefore means that they occupy less road, terminal and deport floor space per seated passenger (*ibid*). However, these buses have fewer benefits in areas where a high proportion of standing passengers is acceptable because they do not accommodate standing passengers on the upper deck and some of the space is usually lost to stair cases.

Double deck buses can be considered expensive in the sense that they have additional costs arising from more complex construction e.g. bus staircases and higher headroom in depots. Double deck buses cannot be operated by poor drivers, on roads that are poorly constructed or maintained and where bridges and other over heads are low (*ibid*). Failing to honour this will lead to serious accidents.

### **2.5.1.3 Articulated buses**

Articulated single deck buses can carry up to two hundred and seventy and sometimes even more passengers (Iles, 2005). These buses are ideal where there is a need to move large numbers of people. Most of these buses have two or at times three joined up passenger- carrying coaches. Articulated single deck buses can be as long as 25 metres, although the common length accepted in most European countries is 18.75 metres. “With well-designed bus stop facilities and effective fare collection system, they can load and unload very quickly despite their size: those used in Curitiba for example, can load in twenty seconds” (Iles, 2005:45). This is possible because they have more than one door like a train to allow more people to alight and delight in a short space of time. Articulated buses are also available in Bogotá. These render trunk-route services and have a 160 passenger capacity ([www.transmilenio.gov.co](http://www.transmilenio.gov.co)). The down side of these articulated buses include:

- They require specialised driving skills particularly when reversing.
- They normally have limited number of routes on which they may be used. This is so because they operate well on straight routes compared to those that meander a lot. They also cannot operate effectively on heavily congested and narrow roads.
- They require specially designed depot facilities because of their size which might be too costly.
- Their more complex design makes them more expensive to purchase and maintain compared to single-deck or double-deck buses.
- Reliability may be a problem where road conditions are poor (Iles, 2005).

Other than single-deck articulated buses, there is also another less common form of articulated buses which is a “semi-trailer combination, with tractor units identical to those used for freight vehicles, towing detachable passenger-carrying trailers” (Iles, 2005: 46). These buses are common in most third world countries (some countries in Africa, Latin

America and Asia). They can be built as double-deckers and can carry as many as 300 passengers. Advantages of this make as compared to articulated single decks discussed above include:

- They are much less complex mechanically
- They are easier and cheaper to build
- Only the tractor unit may be replaced rather than the whole bus in the event of a mechanical failure (ibid).

Disadvantages include:

- Communication between the driver and the conductor is very difficult
- One-person operation is not possible unless fares are collected off the vehicle or by a self service machine.
- A conductor is almost essential to see to the needs of the passengers and this increase operating costs (ibid).

### **2.5.2 Taxis**

These are normally categorised as single deck buses. They can be referred to as short single-deckers which are approximately five to six metres long and can carry between ten and twenty passengers (Iles, 2005). They are also called minibuses or *combis* in other African countries. These vehicles are designed for all passengers to be seated, although some operators try to squeeze in some standing passengers. Some of these taxis usually known as midibuses can be as long as eight metres and can carry as many as 35 seated passengers, sometimes with accommodation for standing passengers (ibid).

### **2.5.3 Motorcycles and scooter-based vehicles**

These are usually three-wheeled road-based public transport vehicles and are very common in several Asian countries and some African countries like Nigeria (Iles, 2005). These vehicles fall into two categories i.e. small ones carrying two or three passengers and the larger versions carrying up to eight and sometimes ten passengers. The larger versions are normally operated on a fixed-route basis and have an open rear for entry and exit. Disadvantages of these vehicles include:

- They offer low standard of comfort
- They are slow (average operating speeds are usually between 8-10 km per hour)
- They are noisy

- They cause severe pollution and passengers are usually exposed to excessive exhaust fumes which may be a threat to human health (Iles, 2005).

Advantages of these vehicles include:

- Capital and operating costs are relatively low
- They can be used to generate extra income on a part-time basis
- Can be operated in narrow residential streets which are not served by other modes, hence they act as feeders to other forms of public transport.
- They are a faster means of travel than taxis in cities where traffic congestion is severe (Iles, 2005).

#### **2.5.4 Human-powered vehicles**

Examples of human-powered vehicles include cycle-rickshaw and becak that are found in Bangladesh and Indonesia respectively. These are based on a bicycle. In Indonesia, these bicycles that are used for individual public transport have a saddle provided for the passenger above the rear wheel (Iles, 2005). Advantages of these vehicles include:

- Just like motorcycles and scooter, they can easily negotiate narrow streets which maybe impassable for other relatively big vehicles.
- They have low capital cost and close to zero operating costs apart from labour.
- Very low maintenance costs
- Cause no pollution because they do not use non-renewable fossil fuel like petrol or diesel.
- Employs a lot of people in these developing countries like Bangladesh.
- Entry into this sector of the market is fairly easy, which is an advantage for the poor who cannot afford large capital to start a big business (*ibid*).

Disadvantages include:

- They are a very slow mode of transport (approximately five kilometres per hour average speed)
- They cause obstruction to faster moving traffic especially on narrow roads leading to more accidents.
- They take the shortest route and this may entail moving against the flow of traffic and this has serious safety implications again.

- Fares charged per passenger per kilometre are relatively high compared to other forms of transport. This is “due to the low productivity of the driver and consequently high labour cost per kilometre” (Iles, 2005: 51).

### **2.5.5 Animal-powered vehicles**

These are mostly horse-drawn and are used for individual public transport in some developing countries like Indonesia. Animal-powered vehicles can carry up to six passengers. One of the advantages of these vehicles is that they do not cause pollution due to their non-use of fossil fuel. However, they are very slow and cannot negotiate narrow roads. They also cause delays to motorised modes of transports where traffic volumes are very high.

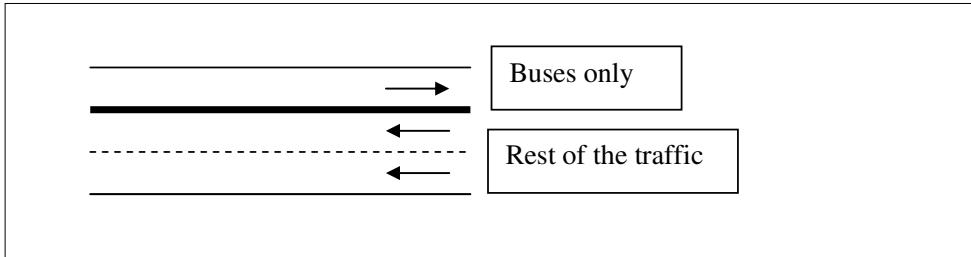
## **2.6 Road-based Public Transport Infrastructure**

Road-based public transport infrastructure does not only embraces the road system, but also terminals, depots and workshops as well as pedestrian facilities (Iles, 2005). This section will not discuss every bit of the infrastructure, but will mainly focus on the road system (bus lanes in particular), terminals/bus stops and pedestrian facilities. These have a direct impact on the users unlike workshops and depots.

### **2.6.1 Contra- and with-flow bus lanes**

Contra- or with flow and bus-only lanes are a relatively cheap and quick way of giving some priority to buses over other forms of road-based modes of travel (Simpson, 1987). Contra-flow means against the rest of the traffic; see Figure 2. Contra-flow bus lanes are more appropriate in one-way systems to afford an easier and more direct route for buses as compared to a longer route that has to be taken by the rest of the vehicles in a one-way system (Wells, 1975). For safety reasons, there may be a need to build a physical barrier to separate the contra-flow bus lane from the opposing traffic.

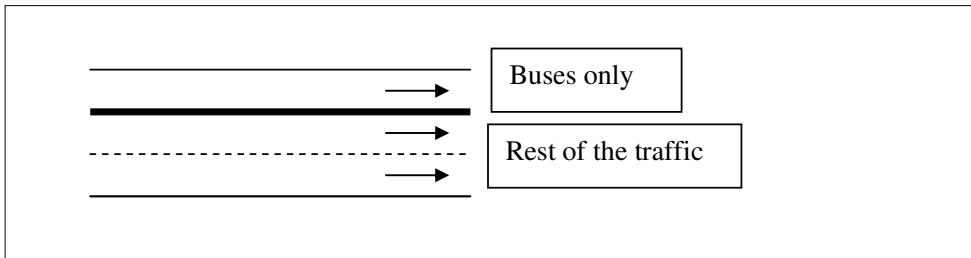
**Figure 2: Contra-flow bus lane**



Source: author after Wells (1975)

With-flow bus lanes mean alongside with the rest of the traffic; see Figure 3. These do not necessarily need a physical barrier (although some have) to separate buses from the rest of the traffic (Wells 1975). In order for road users to know, there is need for adequate signposting. With-flow bus lanes may entail enforcement problems unlike the contra-flow that is self-policing.

**Figure 3: With-flow bus lane**



Source: author after Wells (1975)

Whether contra or with-flow, bus-only lanes run along side lanes for other traffic and are usually limited in scale (Simpson, 1987). They should normally be positioned at the nearside of the roadway, to enable buses to stop at the kerb to pick up and drop passengers. In areas where buses are not required to stop time and again, it maybe more effective to position the bus lane in the centre of the carriageway, this helps overcome the problem of illegal parking in the bus lane that might cause delays to buses (Iles, 2005). The lane itself should be clearly marked throughout its length. This can be done by a continuous solid white or yellow line, up to 400 mm wide, separating the bus lane from the adjacent lane (*ibid*) (see figures 2 and 3). In some countries, other vehicles like delivery vehicles are allowed to use the bus lanes. However, this is done in such a way that they do not disturb buses. Advantages of bus lanes include:

- where properly done, they can lead to improvements in journey times by 50% or more. Journey times for both cars and buses can be reduced following the introduction of bus lanes especially where the volume of bus traffic is very high (Iles, 2005).

Disadvantages of bus lanes include:

- poorly designed bus lane schemes can cause and increase delays both to buses and other traffic rather than reduce them
- can affect nearby streets; for example, displaced parked cars will have to be parked elsewhere. The elsewhere is in this case is nearby streets (Iles, 2005).

## **2.6.2 Bus-ways**

“A bus-way system consists of a network of such tracks, mostly on radial routes leading into the city centre area” (Iles, 2005: 83). Bus-ways are usually completely separate from other traffic lanes and covers a much larger area compared to bus-only lanes (Simpson, 1987). However, they may also be located along side roads or in the median strips of dual carriage ways (Iles, 2005). Because of their widths, most of them do not reach the city centre unless tunnels of elevated trunks are provided. Quite a number of cities in South America have bus-ways and these include Curitiba, Sao Paulo and Bogota (*ibid*). Bus-way stations normally incorporate facilities for the pre-purchase of tickets to minimise boarding times. The spacing of bus-way station affects the average operating speeds and journey times of buses using it. The closer the bus stops; the less the average operating speeds, and the greater the journey times and vice versa. However, whatever the spacing of stops on the outer sections of the routes may be, much closer spacing is normally desirable in city centre areas in order to reduce the distances to be walked by passengers after alighting the bus (*ibid*).

Advantages of bus-ways include:

- They allow greater speed and comfort compared to buses on general purpose roads (Simpson, 1987).
- Bus routes, on bus-ways that are normally confined to the main traffic corridors, are not restricted to a bus-way but may join or leave it at its ends and at intermediate junctions. Hence, passengers travelling from points which are not on the rail system can change modes at these junctions (Iles, 2005)
- Much easier to enforce than bus lanes on ordinary roads

Disadvantages of bus-ways include:

- Their construction involves extensive disruption of existing infrastructure (Simpson, 1987).
- like major highways, bus-ways can divide communities by inhibiting pedestrian movement (Iles, 2005)

### **2.6.3 Pedestrian facilities**

All public transport users are pedestrian at some point during the course of their journey. This makes walking complementary to public transport, hence a need to always talk about pedestrian facilities when talking about an efficient public transportation system (Iles, 2005). Such facilities include footpaths, shade along selected footpaths and crossing facilities etc. Taking an example of footpaths, these are used by public transport users before and after their journeys by buses. They are also used for the entire journey by many people especially school children from low-income homes. This therefore means that improved pedestrian facilities do not only benefit public transport users, but people with low incomes also (*ibid*). Shade provided along selected routes makes walking in harsh weather conditions much easier and comfortable. However to avoid accidents, “bikers need and should have their own trails” separate from foot paths (The New York Times 1995, <http://query.nytimes.com>: 1). This also applies to cattle and horses; they should not mix with motorized vehicles and use pedestrian facilities like foot paths (Luckhurst, 2006).

Crossing facilities are normally provided for safety reasons especially in areas where pedestrians have to cross busy roads. These include:

- *School crossing patrols*: drivers are required to stop when signalled to do so by an authorised person exhibiting a “stop-children” sign
- *Zebra crossings*: this is simply a “mid-block uncontrolled portion of carriageway where pedestrians have a legal priority over motor vehicles
- *Pelican crossings*: pelican is an acronym for pedestrian light control. It is a pedestrian crossing with traffic lights that are controlled by pedestrians. These are more useful in areas of high pedestrian flow by providing specific pedestrian crossing periods and giving a direct indication to motorists of pedestrians’ legal right of way

- *Traffic signals*: these reduce conflict by stopping traffic on one part of the road so as to give way to traffic on the other part. Additional pedestrian-only stages may be incorporated into the signal phasing if pedestrian flows are heavy (O'Flaherty, 1986).
- *Bridges and subways*: these are safer for pedestrians and do not have any effect on the flow of traffic unlike the at-grade crossings discussed above. Chances are zero that a pedestrian will be knocked down by a car since the two are at two different levels. However, they are expensive to construct and could be dangerous if poorly illuminated (especially subways) (Iles, 2005).

### **Bus stops**

Road-based public transport especially buses normally pick-up or set down passengers at designated points, and these are usually bus stops. It is not practical for buses to allow passengers to board or alight from the bus at their convenience because this will increase journey times. This therefore means that travellers have to be grouped at certain points to reduce the number of stops a bus has to make to pick-up or drop passengers. These places (bus stops) have to be protected from harsh weather (heat and rain) if they are to be used by passengers. They also have to be well maintained (clean and illuminated especially at night).

## **2.7 Poverty**

### **2.7.1 What is poverty?**

It is important to note that poverty and development are very difficult to discuss in isolation. In most cases, where there is development there is less poverty and vice versa. Just like development that is measured in monetary terms (GDP or GNP) only by others like those who follow the modernisation approach, poverty can also be measured in absolute monetary terms. Case and Fair (1996, 444) acknowledged that poverty is a difficult term to define but they defined it as “the condition of people who have very low incomes”. Case and Fair’s definition of poverty is linked to Njoroge’s which says “poverty is experienced by people who are limited in choice” (Njoroge, 2002: 17). These definitions are linked in the sense that low incomes limit people’s choice, hence exacerbates their poverty situation. For example, an individual with no money to travel will have to buy goods from the nearest shops despite the fact that they are expensive. This person does not have choice, but to buy whatever is there close to him/her.

This definition only takes the monetary aspects into consideration and does not look at other aspects that were discussed by Amartya (1999). He (Amartya) does not dispute the above definition of poverty but he argues that the definition is not sufficient. In his view “there is need to shift from an exclusive concentration on income poverty to the more inclusive idea of capability deprivation” (Amartya, 1999: 20). Amartya argues that the deprivation of capabilities is reflected in premature mortality, under nourishment, illiteracy etc and they all fall under the five broad categories of freedoms namely: political, social, economic, security and transparency. Absence of one of the five freedoms means a state of underdevelopment and poverty in that specific field and removing these un-freedoms is equivalent to reducing people’s poverty.

Amartya views poverty almost the same way as does the United Nation Development Programme (UNDP). The UNDP uses a measure called the Human development Index (HDI) to measure level of poverty in a country. The HDI is a composite of three basic components to human development and these are longevity (life expectancy which is associated with social opportunities i.e. health), knowledge (adult literacy and mean years of schooling) and standard of living (purchasing power based on real GDP per capita) (UNDP, 1994 in Nixson, 1996). Amartya and the UNDP’s line of argument are too broad for this research. Although there are limitations to income-poverty measures, as has already been said above, this study will mainly concentrate on Case and Fair (1994)’s definition of poverty -the most commonly used for international comparisons- that has readily available data (White and Killick, 2001).

### **2.7.2 What are the causes of poverty?**

This section will explore the causes of poverty. White and Killick (2001) identified four broad causes of poverty and these are: economic, situational, social and demographic and political.

***Economic causes include:*** low growth/ productivity, slow job creation/ capital intensity, inadequate productive assets, macro and market instability, market failures, inequalities of income and wealth and globalisation adjustment (*ibid*).

**Situational causes include:** location e.g. informal settlements on the edge on the city (Huchzermeyer, 2002), environmental degradation and proneness to shocks (e.g. natural disasters and AIDS) (White and Killick, 2001).

**Social and demographic causes include:**

- household composition- households with no economically active members are likely to be poorer compared to those with people who can and are able to work (White and Killick, 2001);
- poor human capital – people with low levels of education are likely to find it difficult to secure employment compared to the educated (Ivory Park ward 77 field survey results, 2006);
- weak social services – where there are no child benefits, unemployment benefits etc (White and Killick, 2001);
- weak traditional safety nets – e.g. people in Diaspora with no or few relatives to help them in times of need (*ibid*);
- gender biases- men get employment easily compared to women and finally
- poverty-inducing social structures (*ibid*).

**Political causes include:** war, instability, displacement, disempowerment, social exclusion and government failures.

The above information suggests that there isn't a single cause of poverty, but it can be a result of many things happening at one go or individually.

Although poverty has a number of causes, this research will focus mainly on location and accessibility that are more relevant to this research.

To show that location and accessibility can in one way or the other cause poverty, there are studies that were carried out in Rio de Janeiro that proved that those living on the urban edge are more likely to be disadvantaged in terms of transport compared to those living near the core of the city. Some of these Rio de Janeiro findings according to (Camara and Banister 1993 cited in Banister 2005:195) include:

- Walk times for those living in peripheral areas were 70% higher than for those living in central areas
- 75% of those making one transfer and all those making two transfers lived in peripheral areas

- Nearly 87% of those who had to travel more than 75 minutes on a one way journey lived in peripheral areas.
- For those living in the centre, 71% were able to spend the equivalent to only two fares a day, meaning that no interchange was necessary
- 65% of those in peripheral areas had to spend at least six fares a day to make the necessary interchanges
- Wait time at the periphery averaged 19 minutes as compared with 6 minutes in the core
- 66% of all travellers from the periphery to the core were able to get a seat for the whole journey, whilst the corresponding figure within the core was 80%
- The higher frequency in the core meant that although buses were overcrowded, it was possible to get a seat for at least part of the journey.

## **2.8 Conclusion**

There is a relationship between poverty, income and lack of choice. The rich who live near places with opportunities have a choice of walking, cycling, driving or catching public transport to work. The poor who live miles and miles away from places of opportunities have no choice, but to use public transport (whether efficient or not) to move from point A to B. Because passenger public transport is usually bad on the urban periphery compared to the city core, poor people find it relatively difficult to partake in most economic and social activities and this exacerbates their poverty situation.

# **Chapter 3**

## **Conceptual/ Theoretical Framework**

### **3.1 Introduction**

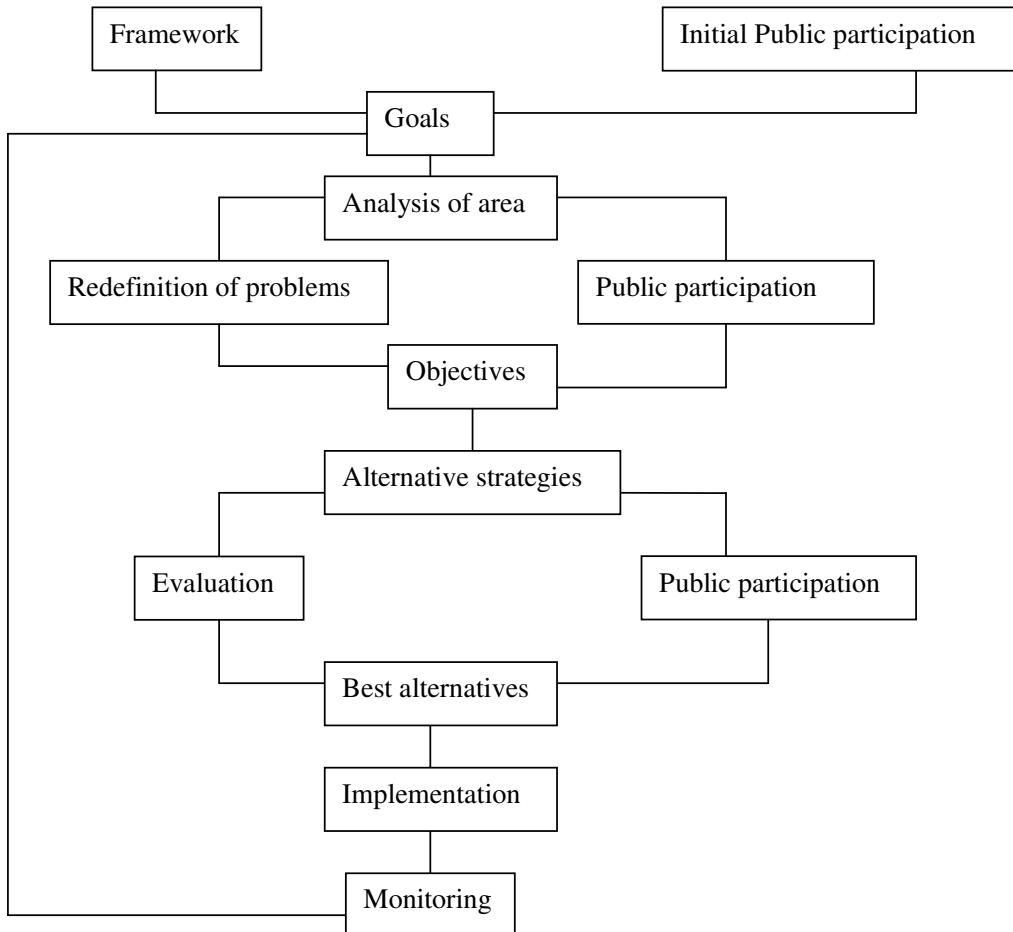
Three theoretical/conceptual frameworks inform this research. The first one is social exclusion. This theoretical framework argues that poverty is as a result of social exclusion caused by poor transportation networks. The second one is the whole debate about the role of the state i.e. the private versus the public debate. The argument is that the state has to play a role in terms of public transport even in a free market economy because the poor have no choice, but to use public transport. The final theoretical framework within which this research is rooted is the broad debate about sustainability. The argument is that public transport is environmentally sustainable in the sense that it consumes fewer resources and emits less pollution as compared to private cars. This chapter concludes by taking a side, of the theoretical frameworks, that the author believes this research is most rooted in.

### **3.2 Social Exclusion**

This research can be said to be located within the broader concept of social exclusion. In cities like London, there is no single agreed definition of terms like social exclusion and poverty; these terms are often used interchangeably (Church, Frost and Sullivan, 2000). However, scholars like Church et al (2007) argue that it is important to distinguish these terms in order to make things clear and avoid confusion. They defined poverty as “an absolute or relative access to material welfare, and social exclusion, [as] a broader concept which usually implies that some people or households are not just poor, but that they have additionally lost the ability to both literally and metaphorically connect with many of the jobs, services and facilities that they need to participate fully in society” (Church, Frost and Sullivan, 2000:197). This definition of social exclusion suggests that poverty is one aspect and falls within the broader concept of social exclusion. From a different angle, one can argue that social exclusion can lead to poverty or exacerbate the poverty situation.

Burchardt et al (1999) as cited in Church et al (2000) argue that many studies found that individuals who are socially excluded found themselves in this situation not by choice, but by circumstances beyond their control. In order to rectify the situation, Burchardt et al (1999) believe promoting citizenship and enabling individuals to have access to public policy making arenas is the way forward. In terms of transport, this would entail ensuring appropriate levels of public consultation and involvement in transport policy arenas (*ibid*). According to Kozlowski cited in Muller (1992), there are four key points within the planning process at which public involvement facilitates decision making or should take place (see Figure 4 below).

**Figure 4: The planning process**



Source: Author after Kozlowski Muller 1992

“These points are at the stage of goal formulation, the selection of alternatives, the choice of the preferred alternative and the sanction of the plan” (Kozlowski cited in Muller (1992: 145). This shows that public involvement is not a once-off event, but it happens throughout the whole planning process.

Church et al (2000) point out that the available research literature makes it possible to group factors or other forms of exclusion, into seven broad categories, that limit the mobility of certain groups of people; hence their social exclusion and worsening of their poverty situation(s). These categories are in one way or the other related to the broad

causes of poverty (that were discussed under section 2.4.2) identified by White and Killick (2001). The seven broad categories are as follows:

**Physical exclusion:** these are the physical barriers that are related to the nature of the transport system and the built environment that inhibit accessibility. These barriers exclude certain groups of people like the elderly and the disabled from using public transport. These physical barriers will eventually lead to social exclusion of these groups (Imrie, 1996 as cited in Church et al 2000).

**Geographical exclusion:** Campbell (1993) and Bartley, (1998) cited in Church et al (2000: 198) point out to “peripherality, poor transport provision and resulting inaccessibility as factors which contribute to urban social exclusion and deprivation”. However, research has also shown that inaccessibility does not always have negative impacts (Church et al, 2000). For example, spatial isolation is some of Athens’ local communities has led to the development of strong local informal networks that are beneficial to community cohesion (Vrychea and Golemis, 1998 as cited in Church et al 2000). Grieco (1994 cited in Church et al 2000) also gave an example of east London (UK)’s isolated communities that have local labour market information networks. This means new transport initiatives are likely to open up these isolated areas to labour market competition and this could disadvantage the local residents who are enjoying the benefits of poor transport networks (*ibid*). This point shows that poor public transport networks can lead to social exclusion of some communities, but does not necessarily lead to poverty.

It is also important to note that improving transport links between areas with high levels of social exclusion and the key activities (socio-economic) is useless if these activities are irrelevant or do not meet the needs of the people who live there (Church, Frost and Sullivan, 2000). In other words, improving transport links between specialised jobs areas that require specialised skills and areas with people with no skills at all is a waste of time.

**exclusion from facilities:** According to Leyshon and Thrift (1995 cited in Church et al 2000), people living in areas with high levels of social exclusion often lack access to a variety of goods and services mainly because of time and income constraints in the use of transport services and the flight of some facilities from these areas. This means such

people in social excluded areas' poverty levels will continue to worsen because they end up paying more for a particular good or service because of its scarcity.

**Economic exclusion:** According to Church et al (2000: 199), "income and transport networks constraints on accessing labour market information can limit the geographical extent of job search and on work travel patterns". This shows that a lack of an efficient public transport and information will force certain groups of people to concentrate their job searches on certain areas instead of a wider area. Hence they will end up accepting low paying jobs or even end up being unemployed. This worsens these people's poverty situation(s).

**Time- based exclusion:** Carers e.g. single mothers in social groups prone to social exclusion are particularly constrained by time in mobility decisions (*ibid*). This means that due to lack of time because of childcare commitments, lone mothers will not be able to travel to different places (e.g. to work) unless there are special arrangements for them e.g. childminding facilities, transport that suit their travel needs etc. If this is not the case, such people will always remain disadvantaged because they cannot earn an income for their families for example.

**Fear- based exclusion:** Some people do not go to certain areas or travel by certain modes of transport because of fear. This means such people are socially excluded and disadvantaged in one way or the other because they cannot interact with people and benefit from services and facilities in areas they are scared to go to. In Johannesburg for example, some people and this includes the author avoid going downtown and travelling by metro trains because of fear of crime.

**Space exclusion:** According to Church et al (2000: 200), "the contemporary security and space management strategies often discourage certain socially excluded individuals from using public and quasi-public ..... spaces". Examples include shopping malls and boomed communities. Shopping mall security guards are likely to stop you and question you if you were extremely poorly dressed. This means the poorest of the poor like the street kids will find it difficult to use such spaces. On the other hand, Oc and Tiesdell (1997 cited in Church et al 2000) argue that certain designs and the style of management as well as the security system of certain areas increase accessibility to vulnerable people

(e.g. the elderly, women and children), who would otherwise be excluded, by reducing fear.

It is quite clear that not all of the above seven broad categories, that limit the mobility of certain groups of people, can be solved by only modifying the nature and availability of public transport. Other measures that are not transport related are likely to see better results of socially including certain groups of people. For example, the mobility of lone parents may be far more influenced by childcare provision, levels of welfare benefits and informal support networks (Smith, 1997 cited in Church et al 2000). However, it is important to note that implementing other measures coupled with improving transport networks is likely to see even better results. For example, adjustments in labour demand and supply, acquisition in new skills as well as adjustment to unemployment benefits coupled with improving public transport networks is likely to improve the nature and success of job search of socially excluded groups.

As was pointed out in chapter two, transport improvements should not be done haphazardly if we want to see social inclusion. Instead, “transport expenditure programmes should ensure that a fair proportion is spent on the modes of transport used disproportionately by low income groups: walking and bus use” (Friends of the Earth Scotland, 2003). The issue about walking and bus use takes us to debates about the role of the state and sustainability discussed below.

### **3.3 Private versus Public Debate – The Role of the State**

Looking at this research from a public transport angle, it is also true that the research is rooted in the private versus public debate i.e. the role of the state. On one hand there is a school of thought that argues that the private sector is more efficient than the public sector. For example, “in the late 1970s the Theory of Contestable Markets suggested that the free entry of new operators into the transport market was the key mechanism to ensure efficiency and welfare maximisation” (Baumol, 1982 and Hibbs, 1985 cited in Knowles and Hall 1992: 34). The London Regional Transport, for example, put out to competitive tender around a quarter of its bus-route network between 1986 and 1989 and it reduced costs by 15% and increased bus-service reliability (Gayle and Goodrich, 1990 cited in

Knowles and Hall 1992). Regulation was accused of increasing prices by discouraging competition.

On the other hand, there is a school of thought that argues that deregulation threatens the viability of minimum transport services in marginal areas and restricts the accessibility of those without private cars to socio-economic activities (Knowles and Hall 1992). This is because “most lucrative segments of the market are the focus of increasingly intense competition; there is little competition in marginal locations, which then receive poor-quality services at relatively high cost” (Mohan, 2002: 70). Hence there is need for some form of regulation of public transport in order to protect the vulnerable (Knowles and Hall 1992). This means the coming in of the state to regulate the industry and this also introduces the whole subject about subsidies.

There are two schools of thought that emerged with regard to subsidies and these are:

1. subsidies are necessary to ensure mobility for the poor and to keep cars off the road in the sense that public transport will be cheaper as compared to private cars hence a lot of people will find more sense in using it instead of private cars.

It is important at this point in time to point out that it is always best to subsidize all public transport because studies found that public transport systems such as those of Zurich or Paris are no less successful because they receive public subsidies (<http://www.ptua.org.au/myths/subsidy.shtml>). However, the most important point to note is that, the way subsidies are applied is more important than whether there are subsidies or not, hence need for good subsidy planning (ibid).

2. money spent on bus subsidies is money wasted to keep a service operating at great cost for the benefit of only a few like politicians (The Star, 1990 cited in Teixeira, 1990: 4). For example, scholars like Simpson (1987: 31) argue that public transport (which involves some form of subsidies) is a “social service which is clear and important to electorates and which therefore carries a lot of weight in persuading politicians to vote for it”. In short, this suggests that government involvement (through subsidy provision) is not necessarily there to better people’s lives but for other motives.

The big debate then is: which school of thought between the two is most relevant for a country or city with a high percentage of poor people to be also included in the city's development(s)? This shall be explored in chapters to come.

### **3.4 Sustainability Debate**

The argument here is that public transport is sustainable compared to private transport. Tolba (2003: 723) defined sustainability as "a condition in which exploitation of useful resources, the directing of investment, the orientation of technological developments and institutional social organisations are in mutual harmony and able to extend both existing and future potential while satisfying human needs and aspirations".

Producing a lot of gasses that are harmful to our environment is living unsustainably. According to the IEA (2000 and 2001 cited in Banister, 2005:1) "the total global emissions of CO<sub>2</sub> (the main global warming gas) have increased by about 60% (1971 - 2001) to nearly 24 billion tonnes". And transport's share of this total has increased from 19.3% to 28.9% (EC, 2003 cited in Banister, 2005). Farrington (1992 cited in Hoyle and Knowles, 1992) points out that the pollutants (Carbon Dioxide, Carbon Monoxide, Nitrogen Oxides, Hydrocarbons, Sulphur Oxides, Lead and suspended particles) emitted by motorised transport are harmful to plants and animals including human life, affecting particularly their respiratory system.

To further support that transport was/is contributing to the deterioration of the living environment, Nash (1976) points out that there was a concern since the 1930s about the rise in road accidents, congestion, noise, air and visual pollution, patterns of land use and the depletion of non-renewable resources especially oil. For example, general road traffic noise affects about 15% of the total USA population and half of the city populations, are exposed to traffic noise considered unacceptably high (Farrington, 1992 cited in Hoyle and Knowles, 1992).

This means something has to be done in the field of transport in order to reduce the amount of pollutants emitted into the atmosphere and other negative effects associated with transport. One possible solution is introducing public transport since private cars have a number of negative effects which include: "urban sprawl, greater consumption of

land for transport, and more material consumption overall” as compared to public transport (EC, 2003 in Banister, 2005: 7). Nash (1976) also supports the point that private transport has more negative consequences compared to public transport.

Although Allsop (2006) highlights the point that many people prefer and enjoy car travel, he makes it clear that there are perennial calls more broadly for public transport to be provided and improved. This is based on the argument “that not only would this deliver better transport outcomes, it would also fix perceived environmental and land use problems allegedly caused by over reliance on the private motor car” (*ibid*: 43). The author supports this line of argument that believes that public transport is environmentally sustainable in the sense that it reduces pollutants from vehicles which may be harmful to our environment and human health. This is based on the argument that public transport like buses has fewer emissions compared to the number of cars that were going to be needed instead of a bus.

Public transport is also more sustainable compared to private transport because it promotes the use of non-motorized modes of transportation. This is based on the fact that all users of public transport are pedestrians or cyclists at some point in time during the course of their journeys. This therefore means the provision of public transport will be done hand in hand with the provision of pedestrian and/or cyclist facilities. One will find that some of the people especially the poor will end up using the non-motorised modes for their entire journeys if the facilities are good. The end result is that there will be a reduction in petrol and oil consumption, hence reduced air pollution from vehicle exhausts since there are few motorized vehicles on the roads (Hidalgo and Yepes, 2005).

First world countries like the United Kingdom encourage people to form lift clubs (use of one car by a number people going in the same direction or destination) as a way of reducing negative consequences associated with private cars. Those cars with more passengers are given priority on the road over those with just the driver. This is a way of trying to discourage a system of one person per vehicle which has a lot of negative consequences.

Although those who support the weak sustainability side argue that there is no need to worry about the negative consequences (especially use of non-renewable energy)

associated with private cars since technology is there to provide a solution- alternative energy e.g. nitrogen: one has to note that we do not have that technology yet so we must deal with what we have presently. This means encouraging people to use less of non-renewable and more of renewable sources of energy (Haughton and Hunter, 1994). The point is, since we do not have a concrete solution yet, let's not damage our environment hoping to solve the negative consequences later (*ibid*).

Other than being environmentally sustainable, public transport is also considered to be economically sustainable because “.... public transport systems .... [are] more efficient and financially viable because more people per kilometre reduce the marginal cost of construction and operation” (Zhang 1999 in Jenks and Burgess 2000: 261). Hence the end-user ends up paying less. However, (Friends of the Earth Scotland, 2003) argue that this is not true because in countries like the UK, public transport users have and are facing rapid price increases that car users are not. For example, “the overall cost of motoring (including purchase, maintenance, petrol, oil and tax and insurance) remained constant in real terms for 25 years (1974 -1999) while the price of public transport increased by 60-80% in real terms” (UK Transport Ten Year Plan 2000 in Friends of the Earth Scotland, 2003). According to the Confederation of Passenger Transport (cited in Friends of the Earth Scotland, 2003) since 2000 when the fuel duty escalator was scrapped, “motoring costs have been falling in real terms ..... , making public transport increasingly expensive compared to car use”. One can therefore argue that private transport was subsidised by public transport though in an indirect way.

### **3.5 Conclusion**

All three conceptual/ theoretical frameworks discussed above are interrelated and this research is rooted in all of them. They are interrelated in the sense that sustainability debates favour public transport, which is mainly associated with the state/ government. Once the government comes in with subsidies; it means marginal areas will be served hence social inclusion of the previously excluded groups.

Conceptualising this research in the broad debate of social exclusion, role of the state and sustainability will help find a way forward for Johannesburg that wants to proactively include or absorb the poor in its development (s).

# Chapter 4

## Description of Case Studies

### 4.1 Introduction

This is a contextual chapter. It describes the two cities in question i.e. Bogotá and Johannesburg. The chapter is divided into two sections. The first section deals with Bogotá and the second with Johannesburg. Both sections give a very brief history of the respective cities, their demographic characteristics, national roles, their spatial characteristics and poverty levels. Quite a number of maps for the two cities are also included in their respective sections. Examples of these maps include: the location of these cities in their countries, geographical location of different income groups etc.

### 4.2 Bogotá

Bogotá was founded by the Spanish in 1538 (Gilbert 1996) and was under its ruler-ship until 1824 when Colombia gained Independence (Hamre, 2007). The Spanish chose an area that was agriculturally rich and with plenty of water and space in which to expand (Gilbert 1996). For location of Bogotá in Colombia, refer to Map1

**Map1: Location of Bogotá in Colombia**



Source: <http://en.wikipedia.org/wiki/Bogot%C3%A1>

#### **4.2.1 Demographic characteristics of Bogotá**

Bogotá's city and metro population stood at 6 778 691 and 7 881 156 respectively in 2005 (<http://en.wikipedia.org/wiki/Bogot%C3%A1>). The city has an average household size of 4.7 people (Cain, Darido, Baltes, Rodriguez and Barrios, 2006). Migration from all over Colombia was the key element in urban growth from the 1930s until the late 1960s. From the 1990s, natural increase has contributed more to Bogotá's growth than migration. For example, in the 1970s, migration generated approximately half of Bogotá's growth, but only 22 per cent by the first half of the 1990s, (Yepes and Bosoni, 1993 cited in Gilbert A 1996). However, it is important to make it clear that this change was/is not due to less number of people migrating to Bogota (e.g. 74,000 arrived in 1992 compared to 57,000 in 1982), but was/is as a result of the new age structure i.e. more child bearing adults now present in the city (Gilbert A 1996).

#### **4.2.2 Bogotá's national role**

Bogotá is Colombia's capital city and the country's largest economic center (Hamre, 2007). Most foreign and domestic companies in Colombia have their headquarters in Bogotá. For example, the city is home to the country's main stock market (Hamre, 2007). According to Revista del Banco de la República (1993 cited in Gilbert, 1996) in 1993, Bogotá was home to head offices of 26 major banks as compared with only five that were located in other cities of Colombia. Bogotá also increased its share of the country's gross domestic product (GDP) from 15 to 25 per cent between 1960 and 1985 (Gilbert, 1996). In 1988, 43 per cent of all students in higher education were studying in Bogotá and 34 per cent of the country's manufacturing employees worked in Bogotá in 1992 (ibid). All this, is evidence to show that the city was and still is the backbone of the country.

#### **4.2.3 Spatial characteristics of Bogotá**

Bogotá is divided into zones and each zone has its own characteristics. Refer to Map 2.

**Zone 1 North:** This is the most modern upscale zone. The highest income bracket neighborhoods, important commercial centers, the best restaurants, shopping centers, and nightlife are in this zone. Most of the places of interest to visitors are in the central and this zone (Hamre, 2007).

**Zone 2 Noroccidente - East:** The city is growing out in this direction (ibid).

**Zone 3 Occidente - West:** This western sector contains industrial areas, parks, the

National University and El Dorado Airport (ibid).

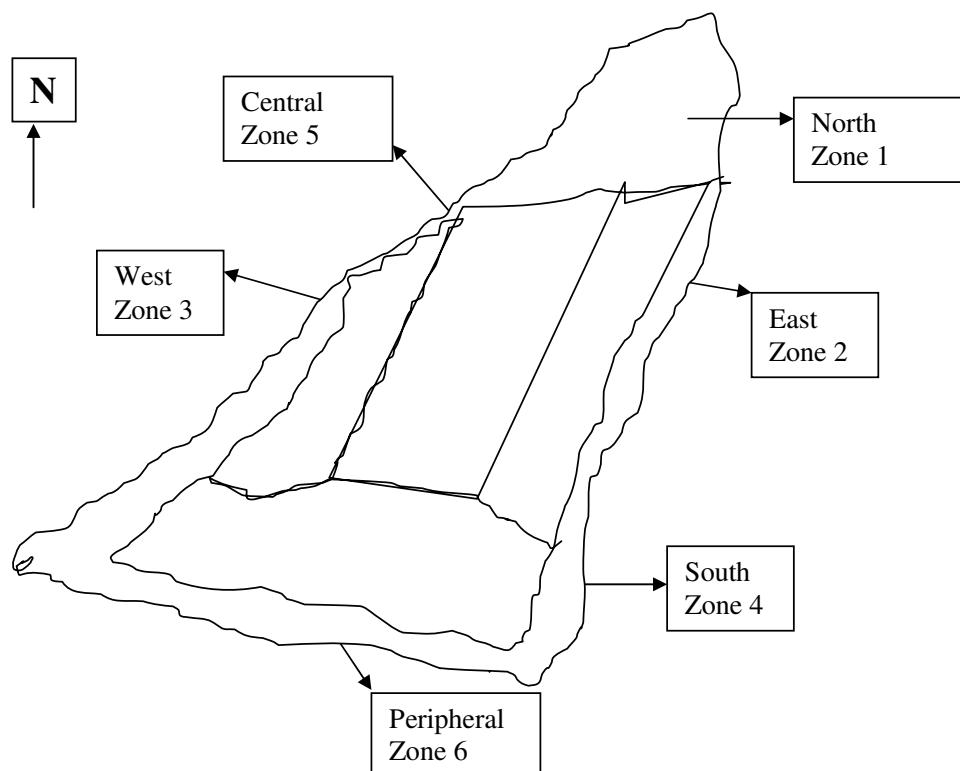
**Zone 4 Sur-South:** The industrial zones and large labor *barrios* are located in the south

**Zone 5 Centro- Central:** The central sector is the city's chief and most important commercial, cultural, governmental and financial zone. The city expanded from this colonial center and thus where most of the great churches are. (Hamre, 2007).

Most of the employment is in this zone i.e. the Central Business District (CBD) and the industrial corridor extending west from the CBD i.e. Zone 3 (Cain, Darido, Baltes, Rodriguez and Barrios, 2006).

**Zone 6:** Surrounding or peripheral areas (Hamre, 2007). That's where most of the poor reside.

**Map 2: A sketch Map showing zones that make up Bogotá**



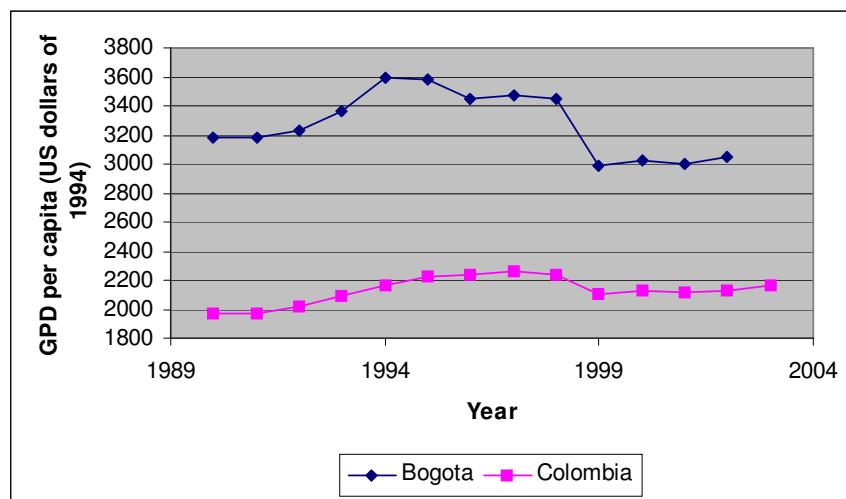
Source: Author after Hamre (2007) and Cain, Darido, Baltes, Rodriguez and Barrios (2006)

#### 4.2.4 Bogotá poverty levels

Colombia's economy grew at a reasonable pace in the first half of the 1990s, decelerated in 1996 and entered a recession in 1999. Recovery has been slow; as a result, income per capita in 2003 was lower than in 1995, refer to Figure 5. The economy of Bogotá the capital of Colombia followed almost a similar pattern, refer to Figure 4. (Adila, 2005).

Per capita income for Bogotá reached a peak in 1994 at US\$ 3,590 and went down to as low as US\$2,993 because of the 1999 recession. By 2002 income per capita had recovered marginally to US\$ 3,052. This is higher compared to the 1999 figure (Adila, 2005). This is exactly the same trend that was followed by poverty in the city. In 1997, 41.9% of the population was poor and in 1999 the figure went up to 54.8%. This was approximately 3.4 million people. Only 6.8% of the population had an income below US\$1 per day per person in 1997, as compared to 11.3% in 1999 (Adila, 2005). Present day situation is better compared to 1999 figures, refer to Table 1. In 2005, 7% of the population in Bogotá was living below the poverty line of US\$1 per day per person. (Please note that the explanation for the above figures is as follows - the average household size of the city is 4.7 people and 7% of the population had an average household income of US\$ 4.2/day, which is less than US\$1 per day per person). Refer to Map 3 for the geographic locations of different income groups in Bogota.

**Figure 5: GDP per capita for Colombia and Bogotá**



Source: Adila, 2005:12

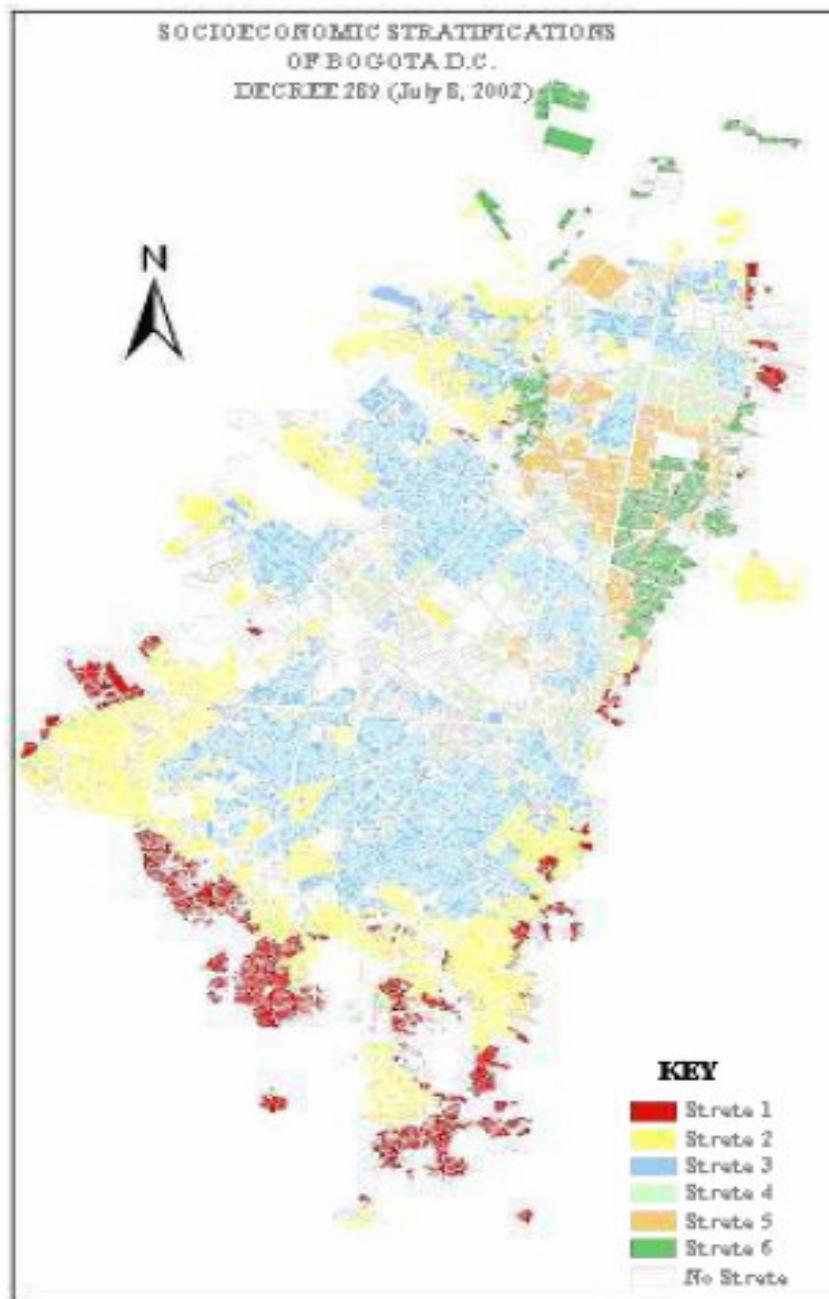
**Table 1: Average household income**

Stratum (Av. Income)	% of Population
1 (US\$4.2/day)	7%
2 (US\$5.9/day)	37%
3 (US\$11.4/day)	43%
4 (US\$24.1/day)	7%
5 (US\$39.2/day)	3%
6 (US\$62.3/day)	2%

Source: Hidalgo and Yepes (2005 in Cain, Darido, Baltes, Rodriguez and Barrios, 2006)

Table 1 also shows that the Gini Coefficient (a method of measuring income inequality) for Bogota is high as there are very few people (2%) with higher incomes and the majority has low incomes. The Gini Coefficient figure for Bogota was 0.58 in 2001([www.uctc.net](http://www.uctc.net)) and 0.58 for Colombia in 2006 (<http://gklingala.blogspot.com>)

**Map 3: Geographic location of Bogotá's different income groups**



Source: Hidalgo and Yepes (2005 in Cain, Darido, Baltes, Rodriguez and Barrios, 2006 – [www.nbrti.org](http://www.nbrti.org))

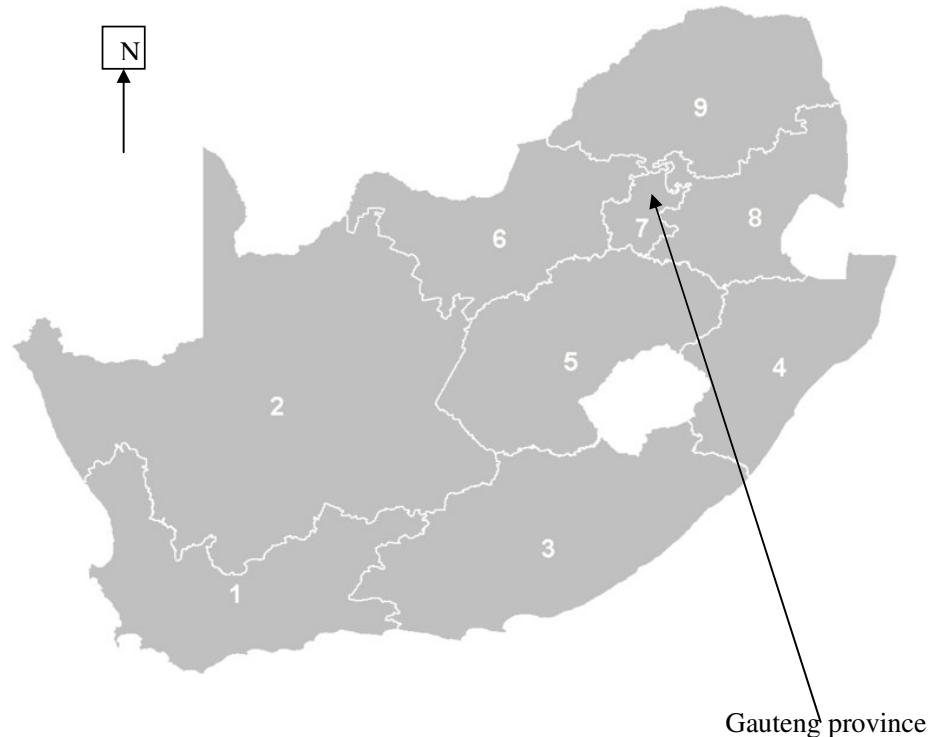
Map 3 above shows the exact locations of different income groups in the city. Strata 1 represent households with an average income of US\$4.2/day, who are the poorest. From

this map, the poorest are located on the edge of the city. On the other hand, high income areas are mostly centrally located. They are located on or near areas of economic and other opportunities. These are represented as strata 6 with an average household income of US\$62.3/day (Hidalgo and Yepes, 2005 cited in Cain, Darido, Baltes, Rodriguez and Barrios, 2006). (Please note that the lower the strata figure, the poorer the area and vice versa)

### 4.3 Johannesburg

Johannesburg, also known as eGoli (place of gold), is the largest and most populous city in South Africa. It is the provincial capital of Gauteng, the wealthiest province in the country and also the largest economy of any metropolitan region in the Sub-Saharan Africa (Johannesburg, Wikipedia free encyclopedia, 2007). Refer to Maps 4 and 5 for the locations of Gauteng province in South Africa and Johannesburg in Gauteng province respectively.

**Map 4: locations of Gauteng province in South Africa**



Source: [http://en.wikipedia.org/wiki/Image:South\\_Africa\\_Provinces\\_numbered.png](http://en.wikipedia.org/wiki/Image:South_Africa_Provinces_numbered.png)

**Map 5: Location of Johannesburg in Gauteng province**



Source: <http://en.wikipedia.org/wiki/Johannesburg>

Map 5 clearly shows that Johannesburg is centrally located within the province of Gauteng. City of Tshwane Metropolitan municipality lies to the north of Johannesburg and to the east is Ekurhuleni Metropolitan Municipality. To the western and southern sides of the city are West Rand and Sedibeng District Municipalities respectively (City of Johannesburg SDF, 2006/7). Mogale Local Municipality is part of the West Rand District Councils ([www.environment.gov.za](http://www.environment.gov.za)) and Emfuleni is one of the three local municipalities comprising the Sedibeng District municipality (<http://www.emfuleni.gov.za>).

Johannesburg was established in 1886 when gold was discovered at Langlaagte, but was initially a suburb of Pretoria as one had to get permission from the government in Pretoria to build a house in it (ibid). Word about the discovery of gold spread throughout the world and this raised the value of the land. Tensions then developed between the Boer government in Pretoria and the British, resulting in the Second Anglo-Boer War. “The

Boers lost the war and control of the area was ceded to the British. The surveyor general, Johannes Rissik, named the city after himself" (Johannesburg wikipedia free encyclopedia, 2007: no page). More organised mining started in 1910 as a result of the declaration of Union of South Africa. Like any colonial government, the South African government instituted a harsh racial system whereby the non-whites i.e. blacks and Indians were heavily taxed, barred from holding skilled jobs, and were forced to work as migrant labourers in Johannesburg's gold mines. Non-whites were forced to live shanty/dormitory townships like Soweto. Soweto stands for South West Township. The regulations of apartheid were abandoned in February 1990. South Africa gained independence in 1994 and Johannesburg became free from discriminatory laws since then. The black townships like Soweto were also integrated into the municipal government system (*ibid*).

#### **4.3.1 Demographic characteristics of Johannesburg**

Johannesburg city is home to about 3, 225, 608 people (StatSA, 2001) and Greater Johannesburg Metropolitan area has a population of about 8 million people (Johannesburg wikipedia free encyclopedia, 2007). The population of the city of Johannesburg is expected to be 4.6 million in 2010 if the annual growth rate measured between 1996 and 2001 continues at 4.1% (GDS, 2006). The average household size of the city as of 2001 was 3.2 which is less than the 1996 figure of 3.6 (GDS, 2006). This growth is due to both migration into the city and natural increase. Just like Bogotá, migration was the only major contributor to Johannesburg's population growth in the past. However, natural increase is seen to be also playing a significant role towards this cause. For example, the number of children born and registered in Johannesburg increased from 51 000 to 54 000 to 61 000 in 2002, 2003 and 2004 respectively (GDS, 2006). Johannesburg is one of the provinces in South Africa with more males than females and a high percentage of economically active age group (StatSA, 2001).

#### **4.3.2 Johannesburg's national role**

Unlike Bogotá which is the capital city of Colombia, Johannesburg does not form one of South Africa's three capital cities (Bloemfontein, Cape Town and Pretoria). However, it is home to the country's highest court - South African Constitutional Court (Johannesburg wikipedia free encyclopedia, 2007). Johannesburg is also the commercial giant for South Africa and it generates 40% and 16% of Gauteng and the nation's GDP respectively

(Jo'burg 2030). Most of the head offices of private companies in the country are in Johannesburg (*ibid*). This also includes the country's main stock exchange which is located in Sandton City. Between 2000 and 2004, the economy of Johannesburg grew by 5.29% per annum on average. Johannesburg is also home to major learning institutions like the University of the Witwatersrand, University of Johannesburg etc.

#### **4.3.3 Spatial characteristics of Johannesburg**

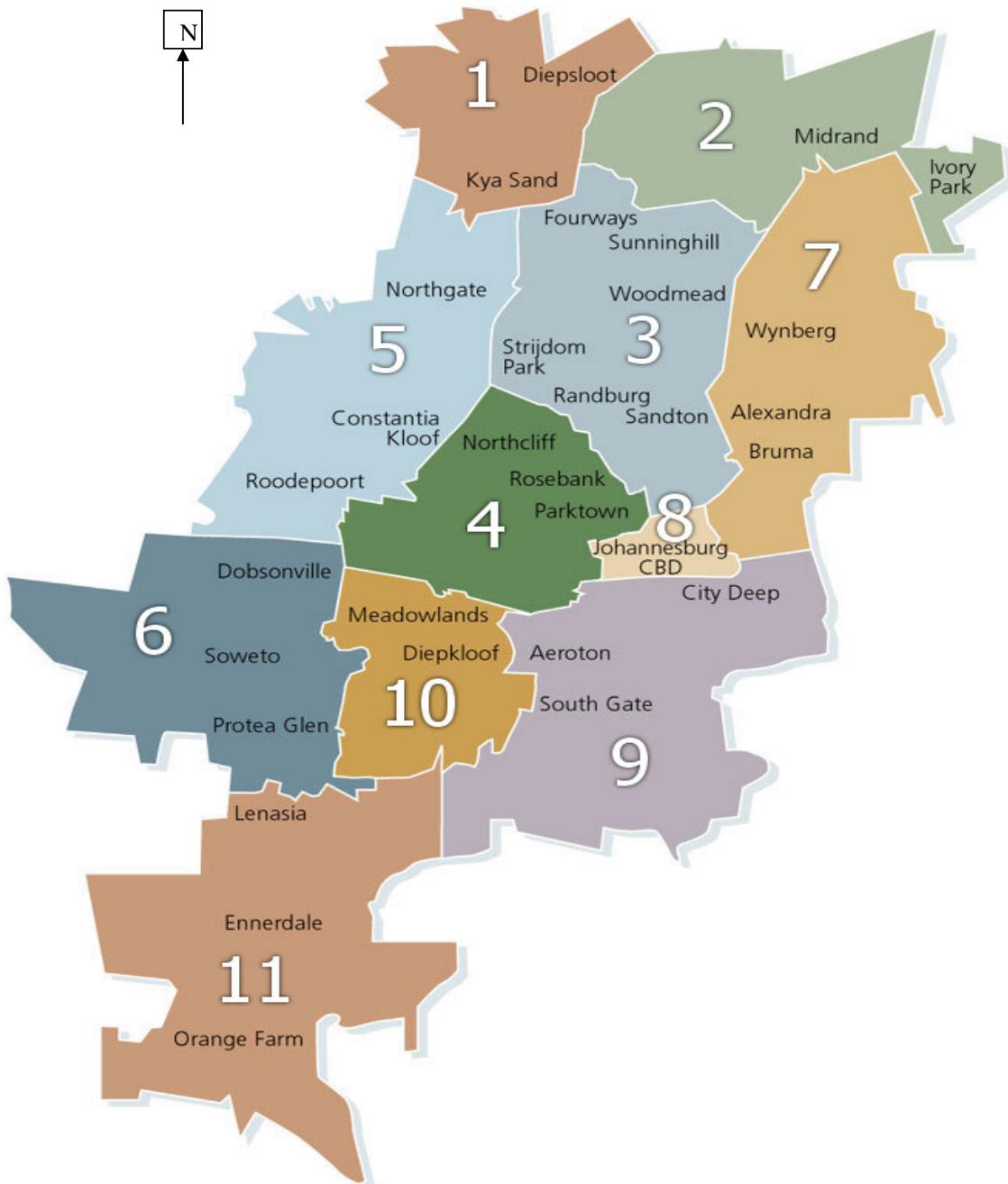
The city is divided into seven regions which used to be eleven before. Refer to Maps 6 and 7 for the eleven and seven regions respectively.

Just like Bogota, Johannesburg is also divided into zones (Refer to Map 8) with special characteristics:

Zone A: This is where all the development is happening. This is where the above two mentioned universities are, as well as the Johannesburg zoo, Sandton city, Rosebank, Midrand and the CBD. Most of the rich and middle class people live here.

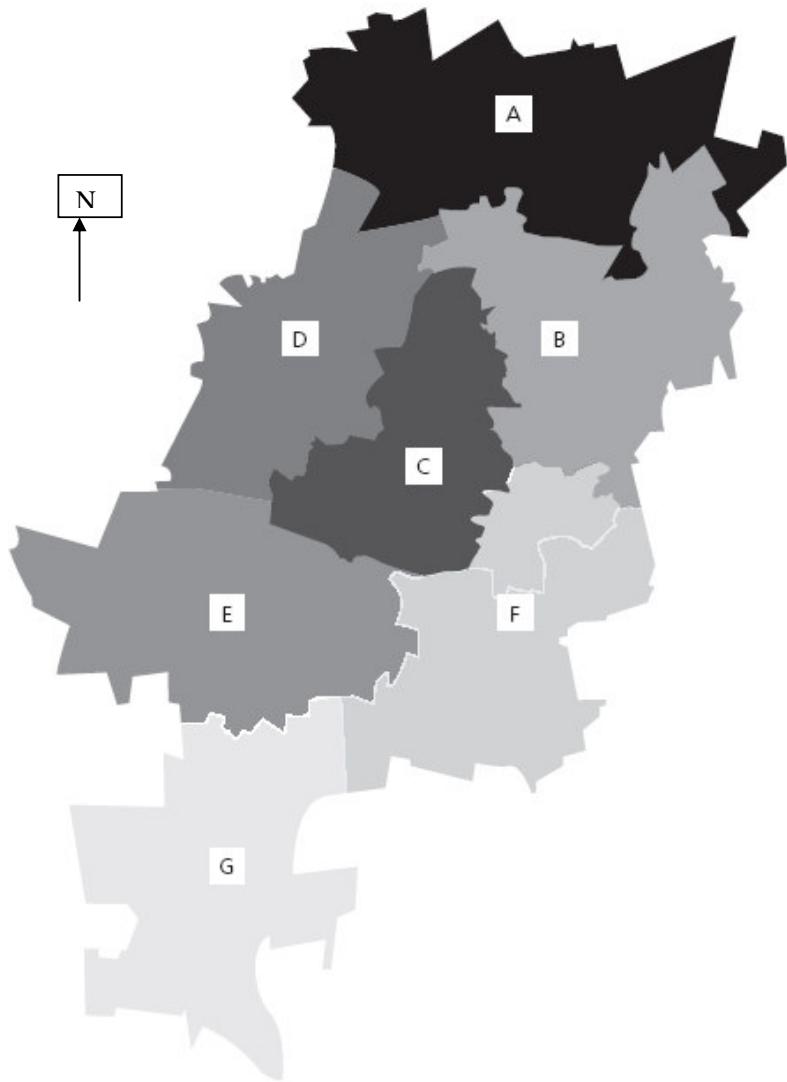
Zone B: Peripheral areas and the South form this zone. Informal settlements like Diepsloot, Ivory Park and Orange Farm and well as Soweto and Alexandra (historical areas because of apartheid) are in this zone. Most of the poor are found in this zone.

Map 6: Previous regional demarcation



Source: IDP, 2006-11

**Map 7: Revised regional demarcation**



Source: IDP 2006-11

**Key**

**A** = Former regions 1 and 2

**B** = Former regions 3 and 4

**C** = Former region 5

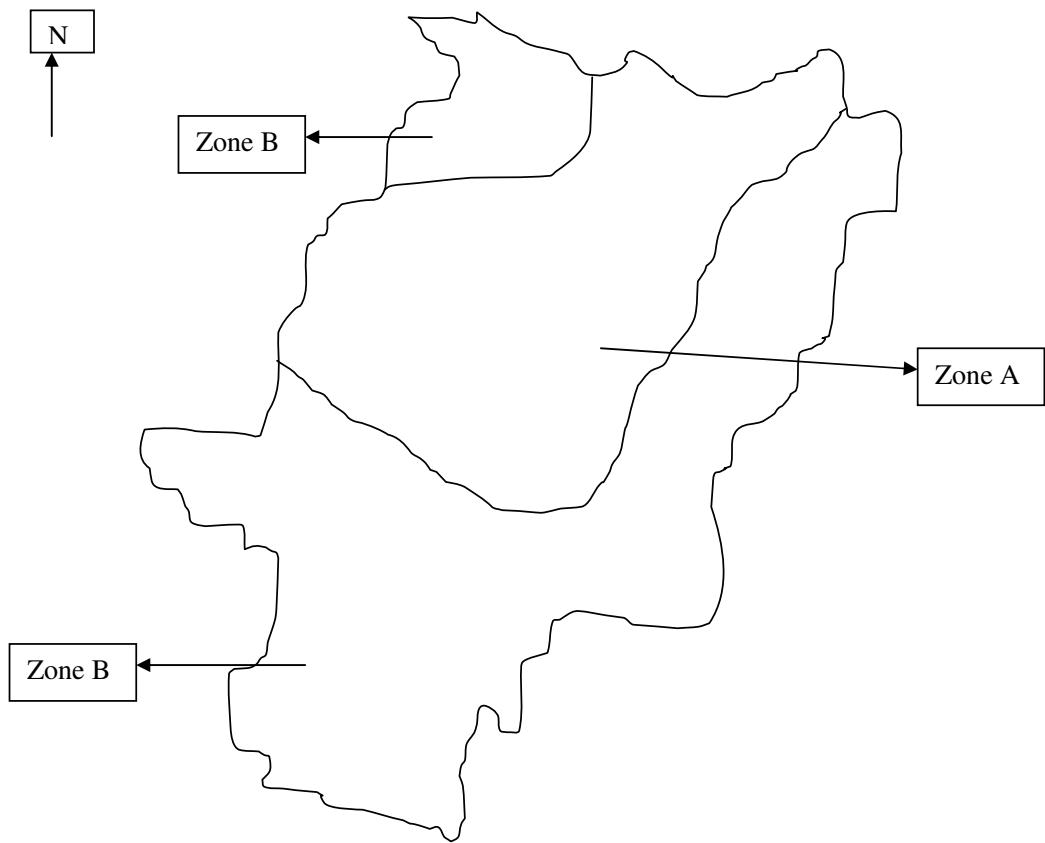
**D** = Former regions 6 and 10

**E** = Former region 7

**F** = Former regions 8 and 9

**G** = Former region 11

**Map 8: A sketch map showing Johannesburg's spatial characteristics**



Source: Author after the 2006-11 IDP

#### **4.3.4 Poverty in Johannesburg**

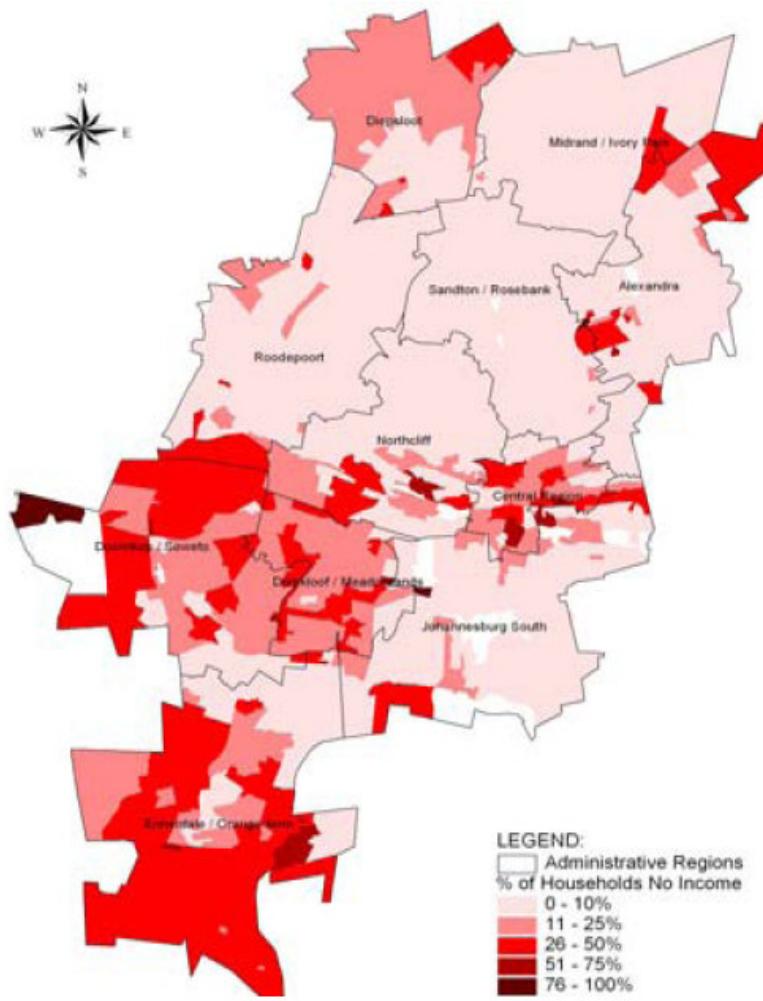
Most of the affluent reside in the Northern suburbs of the city (Map 8, Zone A or pink shade from Map 9). This is the section that is growing because the end of apartheid led to “a large-scale migration of businesses and commerce away from the Central Business District and the southern suburbs, in favour of the more affluent northern suburbs. This was [also] fueled by a rise in the crime rate, serious traffic congestion, inadequate public transport, and a more favourable tax environment for landlords in the northern suburbs prior to the integration of the city” (Johannesburg wikipedia free encyclopedia 2007, no page). Most of the economic activity is happening along the northern section of the North-south Corridor (i.e. Rosebank, Sandton and Midrand). The CBD, where most of the

second economy activities are happening, is currently being renewed in an effort to attract business back into the inner city (ibid).

On the other hand, Just like in Bogotá, most of the poor areas (Zone B: Map 8) are located on the city periphery, (see Map 9 for red and dark red shades). Examples of these areas include informal settlements like Orange Farm in region G and Ivory Park and Diepsloot in region A. Much cheaper accommodation and networks found in informal settlements attract immigrants from across borders and within South Africa, hence high population rates in these areas (Ivory Park ward 77 field survey results, 2006). Just like most of the informal settlements, Soweto and Alexandra are also low income settlements and are part of Zone B. (<http://en.wikipedia.org/wiki/Johannesburg>) and are on the edge of the city.

These poor areas greatly contributed to the, 20% and 33% of households in Johannesburg that received no income and a maximum of R1 600 per month respectively in 2001(StatSA, 2001). R1 600 is approximately US\$213 (R1 600/ US\$7.5 - exchange rate). US\$213/month is equivalent to US\$7/day (US\$213/30 days). This comes to US\$2.2/person/day per (US\$7 / 3.2 people- average household size in Johannesburg). This means 33% of households in Johannesburg were living on an average income of US \$2.2 per person per day as of 2001. (author own calculations after StatSA, 2001 figures cited in City of Johannesburg SDF 2006/7).

**Map 9: Percentage of households with no income in Johannesburg**



Source: City of Johannesburg SDF, 2006/7

#### 4.4 Conclusion

The two cities in question i.e. Johannesburg and Bogota have a lot of things that are almost similar. For example, their demographic characteristics, national roles, spatial characteristics and poverty levels are almost the same. Hence it is possible to compare the two cities and it is possible for one city to learn from the other.

# **Chapter 5**

## **Description of the Actual Research and Findings – The Traditional/Pre-Transmilenio and present Johannesburg Public Transport**

### **5.1 Introduction**

This chapter describes the actual research and findings. The analysis of these findings will be done in chapter 7. The chapter concentrates on pre-Transmilenio and present Johannesburg public transport findings. The first section describes Bogotá's pre-Transmilenio public transportation system and the second talks about present Johannesburg's public transportation system.

### **5.2 Pre-Transmilenio Public Transportation System**

Before the coming of Transmilenio, public transportation was provided almost solely by private buses known as *colectivos*. Refer to Figure 6 for 6 pictures of different kinds of these buses. These could be flagged down at any point along their routes (Bogota Transmilenio, 2007- [www.gobrt.org](http://www.gobrt.org)). The system was of low quality due to an inadequate institutional arrangement among other reasons (Ardila, 2005). In this system, “bus companies obtained route concessions from the government, but the government did not require the companies to own buses. Individual investors, instead, owned the buses..... . Responsibility for service provision, therefore, rested with the bus owners” (Ardila, 2005: 4). Drivers were also hired by the bus owner. In order for bus companies to make more profits, they incorporated as many buses as possible. This led to an oversupply of buses, hence intense competition which is known in Bogotá as ‘*the penny war*’ (*ibid*). It’s a war so to speak because drivers had to fight hard in order to win as many passengers as possible and is similar to what is happening to the taxi industry of Johannesburg.

**Figure 6: 6 pictures of different kind of colectivos**



Source: <http://www.bogota-dc.com/trans/bog-tra.htm>

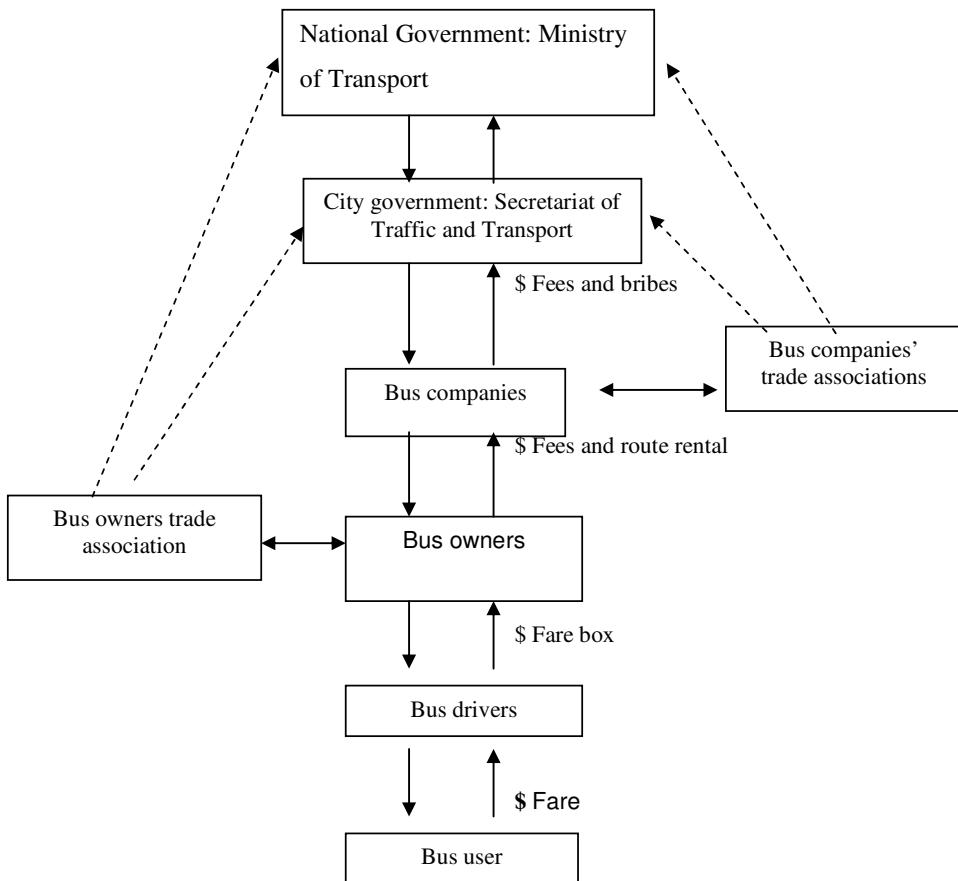
An oversupply of buses as well as a poorly serviced fleet led to a low level of service and a fare above true marginal costs (Ardila, 2005). In short; according to

[http://www.transmilenio.gov.co/transmilenio/eng\\_whatis.htm](http://www.transmilenio.gov.co/transmilenio/eng_whatis.htm). , the system was:

- **Slow:** average travelling time for an ordinary journey in Bogotá was 1 hour and 10 minutes prior 1988.
- **Inefficient:** very long public service routes, with old buses and low-occupancy levels.
- **Promoted inequality:** 95% of the road network used to be crowded by private cars totalling about 1,000,000 vehicles transporting merely 19% of the whole population.
- **Environmental unfriendly:** 70% of particles emitted to the atmosphere came from motorcars.
- **Dangerous:** a high car-accident rate, as well as a significant number of casualties for the same reason

The organisational model for Bogotá's traditional public transportation system is illustrated in Figure 7.

**Figure 7: Bogotá's traditional public transportation system**



Source: Ardila, 2005: 19

In order to understand the organizational structure of the provision of the traditional public transportation in Bogotá, it is necessary to look at the relationships between various stakeholders illustrated in Figure 7 above.

### 5.2.1 National government: Ministry of Transport

In general terms, this is responsible for regulating the provision of public transportation in the country as a whole.

### 5.2.2 City government: Secretariat of Traffic and Transport (STT)

STT was an agency of the city government of Bogotá. Its responsibilities included:

- issuing and enforcing regulations specific to the City of Bogotá as well as those ordered by the national government.

- authorising the creation of bus companies and supervising them.
- authorising new bus routes and determining the schedules, frequency, and determining the fleet a bus company needs for a particular route.

It is therefore correct to say that STT was the central authority in charge of planning and supervising the provision of bus services in Bogotá. However, this was not the case in practice. STT did not have the organizational capacity to adequately perform the above mentioned responsibilities. The organisation could not supervise the bus companies or enforce regulations as per expectations, hence a poor operation of the traditional transportation system (Ardila, 2005).

### **5.2.3 Bus companies**

The law of Colombia allows only bus companies not owners to provide public transportation services in the country (Ardila, 2005). Under the traditional system, these bus companies had rights over bus routes issued to them by STT and they were supposed to own the buses to operate those routes. However, this was not the case on the ground. Most of these companies did not own buses and this shows the lack of enforcement by the city agent of Bogotá. Since most of these bus companies did not have buses, they would rent out their routes to bus owners and make money out of that. Bus owners would in turn pay a monthly fee plus a lump-sum to the bus company. This therefore meant that the more the number of routes a bus company had, the more the money it would make. By 2000, Bogotá had 631 routes legally authorized and 95 to 230 unauthorized as well as 22,031 buses (Ardila, 2005). Issuing out of routes to the bus companies was done in an unprofessional way. The norm was supposed to be that the STT would determine the need for a new route and call for tenders from bus companies to provide a service. However, what really happened on the ground was that the Bus companies would carry out studies to determine the need for a new route and STT would just award that route to whatever bus company that would have conducted the study (*ibid*).

### **5.2.4 Bus companies trade associations**

Bus companies' trade associations were usually headed by Chief Executive Officers of large bus companies. They were there to promote and support the interests of bus companies discussed above by negotiating with both the local and national governments for legislations to be in favour of bus companies (Ardila, 2005).

### **5.2.5 Bus owners**

These were the actual providers of public transport in Bogotá since bus companies did not have buses to ply the routes. Total revenue for the bus owners was determined by the capital invested, operating costs, maintenance costs as well as the demand for the service. Hence, most bus owners overworked their buses and did not maintain them properly as a way of maximizing profits. There were also too many buses owned by too many different owners which made it difficult for the government to control them (bus owners). For example in 1997, there were 20,764 buses of different sizes and more than 25,000 owners, and only two percent of the bus owners owned more than 10 buses and 85% owned one bus or less(Ardila, 2005).

### **5.2.6 Bus owners trade association**

Bus owners were at a disadvantage because bus companies' trade associations represented the interests of bus companies only. Hence some bus owners created the bus owners trade association to help them gain a voice in policymaking (*ibid*).

### **5.2.7 Bus drivers**

This whole poor institutional arrangement saw bus drivers, who were hired by bus owners, becoming the critical actors in the provision of public transportation services in Bogotá. It was also not unusual to see the owner of a bus being its driver. In order to maximise profits, bus owners would hire one driver per bus who would then work for 13 to 14 hours a day and get paid a commission of per passenger (Ardila, 2005).

This saw intense competition which was supposed to benefit the user under normal circumstances because supply was more than demand. Although fares were relatively lower, other conditions were to the disadvantage of the users. For example, drivers:

- Disregarded schedules, stopped at any place where a prospective passenger was and this increased accidents on the roads.
- Adopted dangerous driving habits in an attempt to pick up as many passengers as possible.
- Stopped for a very short time, hence delighting and alighting the bus became dangerous especially for the vulnerable members of the society i.e. the children, the elderly and the women.

- Blocked other buses and race against them hence spreading the lack of safety. All this was done in an attempt to gain the competition.
- Drivers would sometimes order all passengers off the bus and turn back to collect passengers in the opposite direction when rider-ship was low (Ardila, 2005).

### **5.2.8 Bus user**

The bus user paid the price for the inefficiencies of the system. For example:

- Routes were long - on average 29.48 km, and went through few corridors thus creating congestion and increasing competition.
- Since supply was now more than demand, bus companies and STT agreed to include the average number of passengers as an element in the fare structure; hence the fare would automatically go up as the number of passengers decreased. This arrangement is not found in any of the three general types of fare structures that were identified by Haefner (1986) (see chapter two).

In 1998 buses carried on average 350 passengers a day as compared to the international figure of 1,000. Hence between 1993 and 1997 the fare increased by 83% in real terms to compensate for the lower rider-ship per bus. But the quality of service did not increase to an important degree because they were using very old buses with little or no comfort at all (Ardila, 2005).

## **5.3 Present Johannesburg's Public Transportation System**

Just like Los Angeles, Johannesburg is a sprawling city focused much on private transport and lacking a convenient public transportation system ([www.southafrica.info/plan](http://www.southafrica.info/plan), 2007). Public transport in the city consists of minibus taxis, buses, metered taxis and rail. It is beyond the scope of this research to discuss the later two forms of public transport. Much focus is only going to be paid on minibus taxis and buses.

### **5.3.1 Minibus taxis**

These form part of an informal public transport system in the city ([www.southafrica.info/plan](http://www.southafrica.info/plan), 2007). Although they are called taxis, they are not the kind of taxis that are found in the developed world that would drop one on their door step. Instead, they are small scale buses, which operate without any form of subsidy from the

government - usually carry 15 passengers. They do not have formal timetables and neither do they have formal stops save for the main ranks (*ibid*). Refer to Figure 8 below for a picture of these taxis

**Figure 8: A picture of taxis that operate in Johannesburg**



Source: IDP 2007/8

#### **5.3.1.1 Type and numbers of people who travel by taxis**

The minibus taxi accounts for 23% of all transport trips and 72% of all public transport trips in the city of Johannesburg; and it serves mainly the low income population (ITP 2003- 2008 Executive Summary). Of all trips involving a taxi, 65% are made using one taxi all the way, 24% require a taxi-taxi combination and 11% involve transfers to trains or buses (Johannesburg SDF, 2006/7). “Travel time using one taxi all the way is 49 minutes, but a taxi-taxi takes 78 minutes on average” (Johannesburg SDF, 2006/7: 48) They are the most utilised public transport mode across all regions for work related trips because they are the cheapest form of transport regardless of the fact that fares are distance based; hence can be afforded by low income groups. Low income groups also use them simply because “they are the only form of public transport that penetrates every last sector of the city, including the poorest shack settlements”

([www.southafrica.info/plan](http://www.southafrica.info/plan), 2007: 1).

Although overall there has been only a 3% increase (between 1999 and 2002) in the number of passengers carried by taxis, some areas like the low income areas saw a great increase which is more than 3%. For example there has been a 4% (41 217 in 1999 to 42 851 in 2002) increase in the number of passengers who travel by taxi from the broad Johannesburg CBD to areas of economic opportunity like Randburg and Sandton. Routes

from Diepsloot, Roodepoort (mainly a transfer point), Diepkloof and Meadowlands saw a 37%, 86%, 18 and 21% increase respectively (ITP 2003- 2008 Executive Summary).

### **5.3.1.2 Legal status of the taxi industry**

According to the ITP 2003- 2008 Executive Summary, there were 101 taxi associations and 7 117 taxi operators in Johannesburg in 2002. And there are approximately 12 300 taxis that operate on 1 259 routes operated from 444 starting points (Johannesburg SDF, 2006/7). In 2006, while most of the taxis belonged to some form of a conditionally registered taxi association, most of them operated illegally. Out of 12 978 vehicles, only 2 443 had a valid permit and this means 10 535 (80%) were/are operating illegally (*ibid*), hence very difficult to control.

Although parts A and B of Schedule 4 of the 1996 Constitution of the Republic of South Africa states that planning of public transport is a responsibility of all the three spheres of government (national, provincial and local), just like in Bogotá (Colombia) this is not happening on the ground. This high percentage of illegal taxis on the road makes it difficult to regulate the industry and plan for different kind of facilities e.g. ranks and High Occupancy Vehicle (HOV) lanes (ITP 2003- 2008 Executive Summary). The situation is exacerbated by the fact that most of the powers within this industry are “vested in the taxi associations that historically have allowed new taxi operators to ply a route without any reference being made to a regulatory or planning authority” (ITP 2003- 2008 Executive Summary: 52). A complicated vehicle utilisation among taxi operators also makes it difficult for the authorities to plan for this industry. This is because taxi operators do not stick to a single route, but they take turns to operate profitable and less or non- profitable routes. This means a license will need to take all these factors into consideration which is not easy (*ibid*).

### **5.3.1.3 Level of satisfaction by users**

Although taxis perform best, as compared to other modes, in terms of travel and off-peak frequency (e.g. waiting times are less than 10 minutes for 70% of taxi routes) (City of Johannesburg SDF 2006/7); there is a very high level of dissatisfaction among users (ITP 2003- 2008 Executive Summary). Just like the traditional public transportation system in Bogotá, areas of concern include safety, low service quality because most of the taxis are old (around 14 years) and in poor condition ([www.southafrica.info/plan](http://www.southafrica.info/plan), 2007). Taxi

drivers are regarded as the most notorious drivers because they duck wildly from lane to lane and stopping without warning, even in the middle of the road, when a passenger wishes to alight or delight (*ibid*). They do this in order to maximise their profits. Some drivers also operate for very long hours (5am-7pm =14 hour shift) and this compromises safety as their bodies will be tired after normal working hours (8-9 hours a day). As a result, there are a lot of accidents that are caused either directly or indirectly by these taxi drivers.

In short, poor safety record, poor quality of service, taxi wars, the freedom with the taxi operators to choose routes, vehicle type, operation hours, the fact that taxi associations (not transport authorities) decide the number of vehicles that serve the route and the reported dissatisfaction(s) by users especially with regard to drivers' behaviour are all signs of a poorly regulated industry (ITP 2003- 2008 Executive Summary). This situation is very similar to the case of Bogotá's traditional public transportation system discussed above.

In Farris and Harding (1976)'s view (see chapter two), this shows that the Johannesburg passenger transport is not properly operating in the regulatory (economic) system; so as the pre-Transmilenio public transport system.

### **5.3.2 Buses**

Prior 1994 the city's bus service was the centre of the local public transport system, but competition from the private car (partly due to an increase in the middle class who could afford private cars) and minibus taxis drove it into decline ([www.southafrica.info/plan](http://www.southafrica.info/plan), 2007). Scheduled bus services that operate within or into the City of Johannesburg include Metro bus, refer to Figure 9, Putco Soweto, Eldorado Park tendered contracts, South Western Areas tendered contracts, Germiston Transport Department and some tendered contract services from Katorus/Boksburg and Tembisa (ITP 2003- 2008 Executive Summary). 9% (44,002) of all public transport trips in the city are made on these buses (both Metro and non-Metro). Buses receive an annual subsidy of around R300 million (City of Johannesburg SDF 2006/7).

**Figure 9: Pictures of Johannesburg Metrobuses**



Source: <http://www.joburg.org.za/services/metrobus1.stm>

### **5.3.2.1 Metrobus**

The Johannesburg Metropolitan Bus Service – Metrobus is wholly owned by the city of Johannesburg (<http://www.joburg.org.za/services/metrobus1.stm>). “Metrobus is a people-centred public service that provides transport across Johannesburg to workers, scholars, students, the elderly, people with disabilities [15 buses] and leisure seekers. The aim of the Metrobus is to become a faster, friendlier and more functional bus service for passengers” (ibid: 1)

There are approximately 550 single and double-decker Metrobuses, plying 84 different routes in the city (Johannesburg- Wikipedia, the free encyclopedia, 2007). Out of the 550 buses, 200 are modern (150 double-deckers and 50 single-deckers which were made in 2002) (ibid). The whole Metrobus fleet carries roughly 20 million passengers per year (ibid). Metrobus invested R7-million in Global Positioning System. This allows the company to track the movements and identify the exact location of its buses at any given time, hence quicker problem solving which benefit the users at the end of the day. (<http://www.joburg.org.za/services/metrobus1.stm>).

Although they are subsidised, buses are more expensive compared to taxis. Fares depend on the distance travelled and are controlled by the City Council. Buses travel across eight zones from Kempton Park and Edenvale in the east of the city to Witpoortjie in the west and Midrand extension in the north and to Kibler in the south. The longer the distance the higher the fare, because the fare to be paid is determined by the number of zones a passenger is going to cross (see chapter two - components of the passenger transportation

system – the way) (<http://www.joburg.org.za/services/metrobus1.stm>). It is much cheaper to use a prepaid tag than to pay cash every time you board the bus. Tags come in different colours for specific group of users. Adult commuters use green tags, school children use red, disabled people use yellow and pensioners use black. Once you purchase your tag, the amount available is recorded and deducted as you make bus trips. Infrequent users have an option of using a stored value tag that works like a debit card (ibid).

The positive aspect about buses is that they are of better quality as compared to taxis and trains. For example, the Metro buses are clean and try by all possible means to follow their timetable/schedule. Drivers stop at bus stops to allow passengers to climb in or out of the bus. Unlike the taxi drivers who drive and collect money at the same time, most bus drivers issue tickets to passengers while stationary. Travelling speeds are reasonable, because their salaries do not depend on the number of passengers ferried - they receive a fixed salary. Unlike taxi drivers, bus drivers work normal hours (6 hours of driving compared to 14 hours for taxi drivers) which means lower accidents as compared to taxis. This is because they (bus drivers) are able to concentrate the whole time during their shift. In short, buses offer a better service as compared to taxis, save for the fact that they are expensive and do not serve some areas.

## **5.4 Conclusion**

The pre- Transmilenio and present Johannesburg public transport systems are similar. Save for the Johannesburg buses (Metro buses), both transport systems could be described as poor, inefficient and unsafe.

# **Chapter 6**

## **Description of the Actual Research and Findings – The Transmilenio and proposed Johannesburg Public Transport**

### **6.1 Introduction**

This chapter discusses the present public transport system of Bogotá and the proposed/envisioned Johannesburg public transport system which is based on the Bogotá model. An analysis of these research findings is done in the next chapter.

### **6.2 Bogotá’s Transmilenio Public Transportation System**

The coming in of Enrique Peñalosa as Bogotá’s city elected mayor in 1998 saw the beginning of a change in the city’s public transport system. “Peñalosa had plans for transforming the main transportation corridors in the city with a bus rapid transit system known as Transmilenio” (Adila, 2005: 5). Peñalosa’s main aim was to end the penny war by encouraging competition for the market and not in the market (*ibid*). Six major changes were introduced into Bogota’s transportation system and these are:

- The creation of the new agency, Transmilenio Co, by the city government. This company is not allowed to own buses. The new agency’s responsibilities include being in charge of contracting the provision of bus services along high-quality standards, developing a bus rapid transit system using high-capacity buses and a trunk and feeder system and regulating bus services, possibly beyond its own corridors and extending into the non-Transmilenio system.
- Large bus companies that used to obtain profits from renting out routes but not operating buses had to own their bus fleet and would have to operate under high efficiency standards.
- Transmilenio Co. holds a competition for the right to operate the Transmilenio routes. Bus companies that win the bid to provide a certain level of service in the corridors become Transmilenio operators.

- Transmilenio pays its operators on a basis of kilometres logged by the bus fleet and not per passengers transported. This helps lessen the dangerous competition for passengers. However, it is important to note that not all of the payment to the operators is determined by the distance logged. Distances from the garages to the starting or loading points are not paid for.
- Transmilenio Co. has in place a system to supervise operations of buses in order to make sure that operators stop at stations to drop and or pick-up passengers
- The operators have an incentive to provide a high-quality service to attract more passengers because the contract between them and the Transmilenio Co. assigns demand risk to the operators. For example, the extra revenue goes almost entirely to the operators if more passengers than estimated use the system (Adila, 2005).

It is important to make it clear at this point in time that the Transmilenio is not the only system that is operating in present day Bogotá. There are basically four broad public transportation services and these are:

1. The traditional bus service: The system was discussed above and it serves the majority of the city demand (Adila, 2005). These did not change after the introduction of the Transmilenio.
2. The consortia: A spin off from the traditional system groups traditional bus companies into consortia. Each bus company supplies the bus routes it owns to the consortium, and the consortium then attracts investors who purchase new buses. Differences between this system and the traditional one are - the consortium is responsible for operating the bus fleet and the bus drivers get paid a salary and not a per passenger commission (*ibid*). The way this system operates is also different from the Transmilenio to be discussed in detail below. For example, these buses do not use the Transmilenio ticketing system and are not allowed to operate on Transmilenio routes. In short, they are bus companies that decided to move away from the traditional system but did not want to join the Transmilenio. Hence they offer a better service as compared to the traditional system but not up to the Transmilenio professional standards.
3. The informal or illegal operators: This is locally known in Bogotá as pirate. Two types of informal operators can be identified. The first are buses that used to belong to the traditional service that do not pay their dues to the company they claim to belong

to by merely having the same colour as that bus company. The second type of informality are the operators that provide a service at night or in areas of the city where formal services are very few or do not exist at all. These use jitneys and other small vehicles/cars (Adila, 2005).

4. The Transmilenio: This operates under a trunk and feeder system. Although the other three services are playing an important role in present Bogotá's public transportation system, much focus shall be paid to the Transmilenio system and others will be mentioned here and there. This is simple because the traditional system was discussed above and time does not allow me to discuss the other two (informal or illegal operators and the consortia) in detail.

### **6.2.1 What is Transmilenio?**

Transmilenio is a public/private system, designed for operation by private contractors under government oversight. It uses Volvo and Mercedes articulated buses and standard feeder buses built in Brazil and assembled in Colombia, refer to Figure 10.

**Figure 10: Pictures of Transmilenio Buses**



Standard feeder bus

(average = 70 passengers)

Source: Cain, Darido, Baltes, Rodriguez and Barrios, 2006



An articulated bus

(Trunk operator – capacity of 160 passengers- 48 seated and its 19 m long.

Source: Cain, Darido, Baltes, Rodriguez and Barrios, 2006

The articulated red buses have high, automatic transmission, pneumatic suspension and anti-lock brakes, 4 large doors on the left side that are synchronised with the station doors –average dwell time is 25 seconds. Also Equipped for people with physical needs- has specific seats for disabled persons, the elderly and pregnant women) (Cain, Darido, Baltes, Rodriguez and Barrios, 2006)

The Transmilenio system runs without any operating subsidy from the government. It is designed for 100 percent farebox recovery. The public authorities (national and city governments) are there to cover capital investments only (<http://www.apta.com/services/intnatl/intfocus/bogota.cfm>). The system is comprised of four components and these are: specialized infrastructure, efficient operations, advanced billeting and a new institution for system planning, development, and control (ibid).

#### **6.2.1.1 Specialised infrastructure**

There were two phases of Transmilenio that were operating and plans to start working on the third phase as of December 2006 (Transport Innovator, 2006). The third phase was/is expected to begin this year with completion in December 2009 at a total cost of US\$ 659 (ibid). Phase three will also have new larger buses with three sections and two articulations with a capacity of 270 passengers; refer to Figure 11. This phase three bus was presented to the public on the 10<sup>th</sup> of May 2007.

**Figure 11: Transmilenio Bus with double articulation**

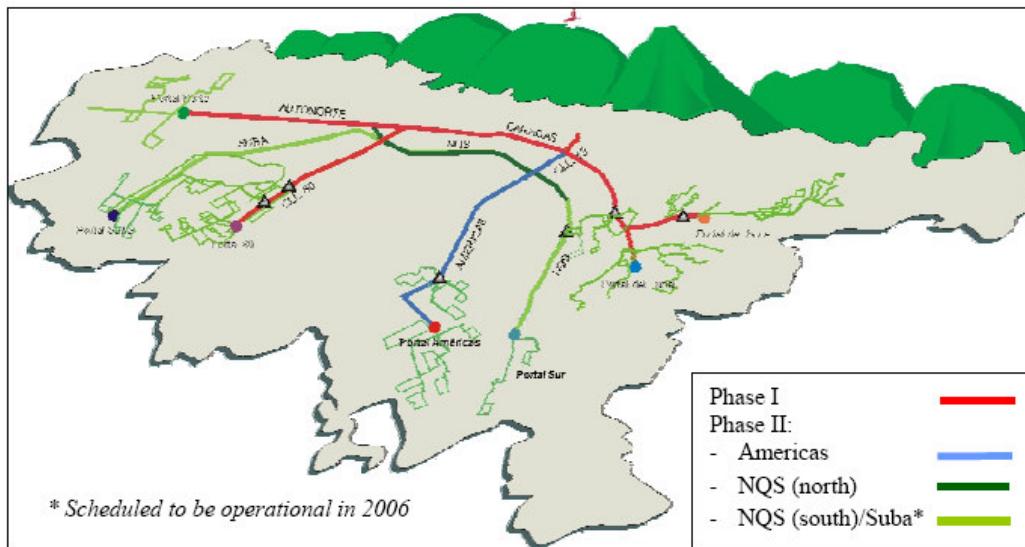


Source: <http://en.wikipedia.org/wiki/Bogot%C3%A1>

Transmilenio phase 1 began in 2000 with three trunk corridors totalling 42 km and seven feeder routes totalling approximately 309 kms. Phase 2 was opened in December 2003 with three trunk corridors also totalling 42 kms in length and seven zones feeder network

coverage (which serve most of the peripheral/poor areas) totalling 509 kms (Cain, Darido, Baltes, Rodriguez and Barrios, 2006). Refer to Map 10 for network coverage and Table 2 for detailed information on infrastructure and costs of Phase 1 and 2 of the Transmilenio system.

**Map 10: Transmilenio phase 1 and 2 routes**



Source: Transmilenio SA (in Cain, Darido, Baltes, Rodriguez and Barrios, 2006: 7)

**Table 2: Transmilenio phase 1 and 2 infrastructure and costs**

	Phase I	Phase II		
		Americas	NQS*	Suba*
Length (dedicated busway)	41 km (25.6 miles)	13 km (8.1 miles)	18 km (11.2 miles)	10 km (6.2 miles)
Busway lanes per direction	1 / 2	2	1	1
Feeder network coverage	7 zones (309 km / 192 miles)		7 zones (509 km / 316 miles)	
Terminal stations	4	1	1	1
Intermediate stations	4	1	1	0
Standard stations	53	16	21	13
Pedestrian overpasses	30	10	25	4
Buses	470 articulated (trunk) 235 conventional (feeder)	+335 articulated (trunk) +200 conventional (feeder)		
Expected date of commissioning	Different sections opened between 2000 and 2002	Opened 2003/2004	North: 2005 South: 2006	Expected 2006
Cost (\$US)**	\$240M	\$117M	\$286M	\$142M
Funding sources	Local Fuel Surcharge (46%) Local General funds (28%) World Bank Loan (6%) National Government (20%)	Local Fuel Surcharge (34%) National Government (66%)		

Source: Cain, Darido, Baltes, Rodriguez and Barrios, 2006: 7

Table 2 above shows that phase 1 of the transmilenio has 470 articulated (for trunk service) and 235 conventional (for feeder routes) buses operating on 41km of dedicated busway and 309 km of feeder network respectively. The system has 4 terminal stations (main stations found at the end of each trunk corridor and they are for entering the trunk corridor and feeder routes), 4 intermediate stations (located along trunk corridors to allow passengers to quickly transfer between trunk routes and or between trunk routes and feeder routes), 53 standard stations (either providing access for passengers to travel from one platform to the other or with two totally separate platforms) and 30 pedestrian overpasses. All this amounted to US\$240 million. Phase 2 has more than 335 articulated and over 200 conventional buses operating on 41km of dedicated bus way and 509 km of feeder network respectively. In addition to this, the system also has 3 terminal stations, 2 intermediate stations, 50 standard stations and 39 pedestrian overpasses. The total cost for phase 2 was approximately US\$545 million (Cain, Darido, Baltes, Rodriguez and Barrios, 2006).

From Table 2, both phases have one and two busway lanes per direction. The single carriageway usually has an additional passing lane at the stations along the routes. As of May 2006, the system had 33km and 32km of dual and single carriage way respectively plus 16km of single carriageway that were under construction on NQS and Suba corridors (*ibid*). Refer to Figure 12 for pictures of a dual and single carriage ways. Both of them are with-flow bus ways and these were discussed in chapter 2.

**Figure 12: Pictures of a dual and single carriage ways**

Dual Carriage way



Single carriage way



Source: Cain, Darido, Baltes, Rodriguez and Barrios, 2006: 9

Stations along the corridor like the one shown on Figure 12 – dual carriage way are located approximately half a kilometer apart within the median and are usually five meters wide. Transmilenio stations have platforms that are the same height as the floor of the bus for easy boarding of all passengers (e.g. those on wheel chairs, pregnant women, mothers with push chairs etc) Pedestrian access is provided through footbridges like the one shown on the same picture or subways or signalized intersections discussed in chapter 2. The system also has walkways and cycle track for pedestrian and bicycle access (Cain, Darido, Baltes, Rodriguez and Barrios, 2006).

#### **6.2.1.2 Efficient operations**

The System operates with the proper number of buses needed to meet the demand for transportation (refer to Table 2 above). The operational scheme comprises trunk-route services (express services and ordinary services) and feeder services.

Express service buses stop at given stations only while ordinary services serve all the stations along the whole trunk route. This combination allows enhanced capacity for the system to give a better service to users, thus increasing the utilization of the fleet by attaining more daily cycles per bus. “Feeder services attend to peripheral passenger zones on an integrated basis in combination with the trunk-route services. This allows users to go from their neighbourhoods to main terminal or midway stations by switching from the system’s green feeder buses to its red articulated vehicles without having to pay additional fares” (<http://www.transmilenio.gov.co> : no page)

Unlike the traditional/ pre-Transmilenio system and in Johannesburg (the taxi drivers’ case) where very little checks are made about the qualifications of a driver, operators of the Transmilenio are required to hire trained and certified drivers who can operate an articulated vehicle. These drivers can only drive a total of six hours per day and get paid a fixed salary (by Transmilenio operators) instead of the traditional system of per passenger commission. To ensure quality operations by the Transmilenio system, “drivers are supervised by the operator they work for and by a control centre owned by Transmilenio. From this control centre, Transmilenio Co. is able to know the name of the driver driving each and every bus in the system” (Adila, 2005: 52).

Just like the Johannesburg Metrobus, the system has a global positioning system installed in each bus; hence the control centre is able to know the exact location of every bus. This

control centre is also able to let drivers know whether they are ahead or behind schedule. Each Transmilenio bus has a radio system to allow communication between the driver and control centre as well as a hidden alarm system for in case of an emergency (Adila, 2005).

#### **6.2.1.3 Advanced billeting**

Transmilenio uses a pre-paid fare method whereby passengers use contact-less smart cards that can be charged at nearby ticket boots and automatically debited at the turnstiles to access the stations where they can board the buses through multiple doors. Fares are collected by a private company that deposits daily revenues in a trust fund. These are distributed weekly to sustain agents (Cain, Darido, Baltes, Rodriguez and Barrios, 2006).

The collection method system includes card production and sale, acquiring, installing and maintaining equipment for access control, information processing and handing/management of collected money (<http://www.transmilenio.gov.co>). Unlike the Johannesburg taxi and the Bogotá traditional systems, this Transmilenio system makes sure that drivers focus on driving and do not get interrupted by passengers wanting to pay. This is because the system works in such a way that passengers pay upon entering the station and not upon entering the bus (Adila, 2005).

#### **6.2.1.4 An institution for system planning, development, and control**

The institution that is responsible for system planning, development and control is called the Transmilenio S.A. It has a sound staff structure. Its working and functioning processes are financed by 4% of the money obtained from trip selling and secondary activities such as advertising at stations. Transmilenio has a control center that supervises the operations of the Transmilenio buses through satellite localization and voice and data communication means. It also monitors the number of passengers entering and leaving the station (<http://www.transmilenio.gov.co>).

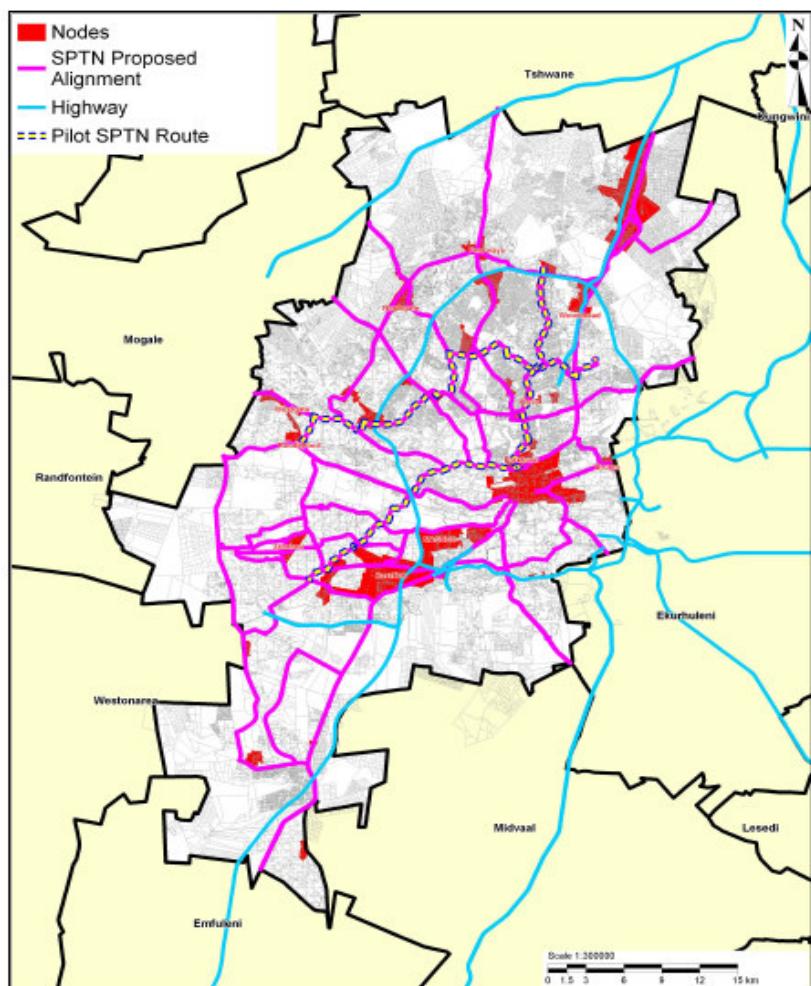
### **6.3 Proposed Johannesburg Public Transport System.**

Please note that the envisaged Johannesburg public transport system has got a lot of aspects in it. For example it includes the recapitalisation of the taxi industry, the underground Gautrain that is under construction, the Bus Rapid Transit (BRT) system etc. However, it is beyond the scope of this report to discuss all these aspects in detail. With regard to road based public transport, much focus shall only be paid to the BRT system

since there was a change of direction in the City's Transportation Sector Plan. This is a move from the Strategic Public Transport Network (SPTN) (refer to Map 11) to the new Rea Vaya Bus Rapid Transit system that was approved by Council in November 2006 (City of Johannesburg IDP, 2007/8).

The SPTN was “based on a network of routes along the City’s primary Mobility Spines linking and enhancing accessibility between residential departure points and nodal destination points ..... [One of its objectives was] to channel public transport routing into focused high frequency corridors, rather than the present dispersed, less frequently serviced and customized routing” (City of Johannesburg SDF, 2006/7: 48).

**Map 11: Proposed SPTN Alignment**

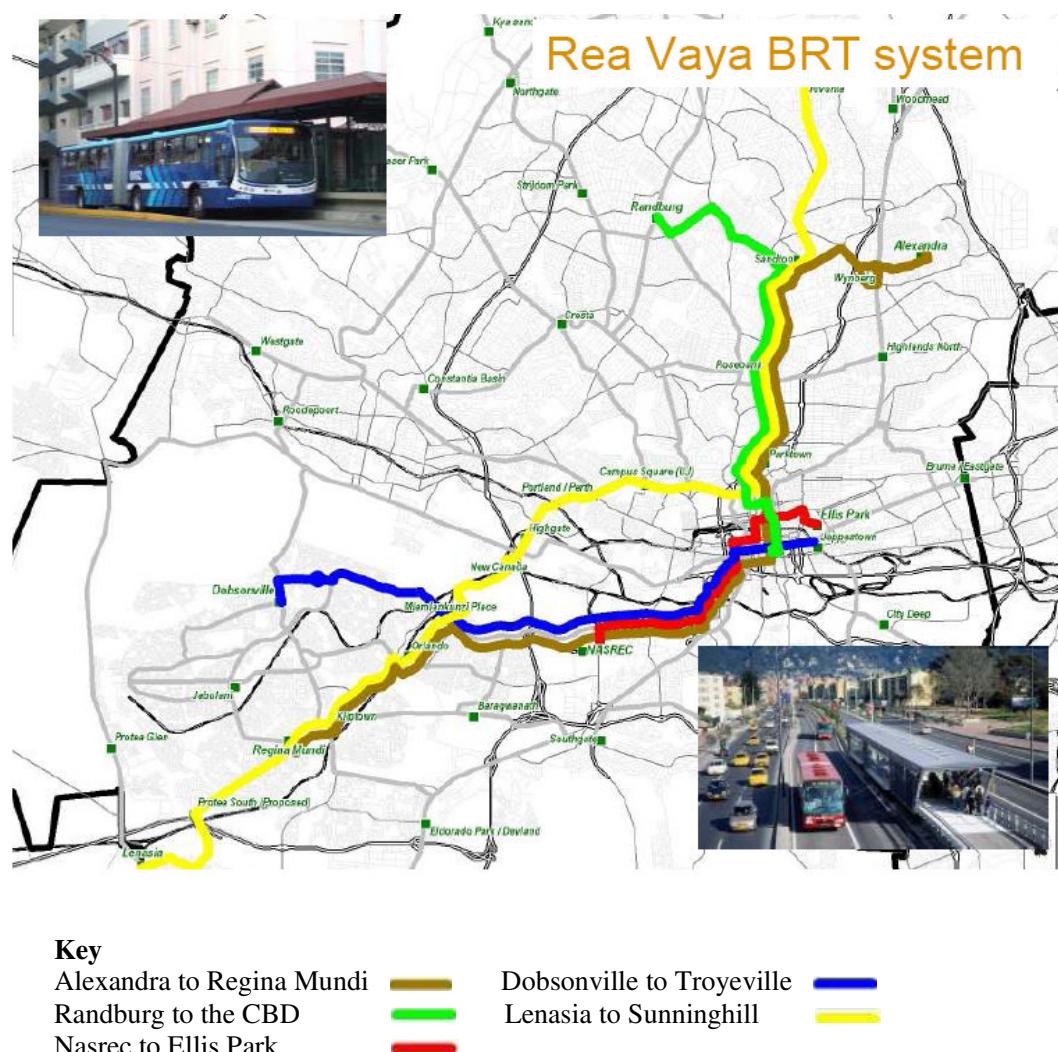


Source: City of Johannesburg SDF, 2006/7

### 6.3.1 Rea Vaya Bus rapid transit system

Phase 1 of the Rea Vaya with a total of 94km of trunk corridors, encompassing a total routing length of approximately 148 km is supposed to be built in time for 2010 soccer world cup – envisaged to be operating by April 2009 (City of Johannesburg IDP, 2007/8). Refer to Figure 13 for Rea Vaya Phase 1 routes. “In phase 1 of the system, buses will operate from Lenasia to Sunninghill; Alexandra to Regina Mundi in Soweto; Dobsonville to Troyeville; Nasrec to Ellis Park; Randburg to the CBD; and on an inner city circle route” (Davie, 2007: no page).

**Figure 13: Rea Vaya Trunk Routes Phase 1**



Source: Transportation Department (2007) [www.joburg-archive.co.za](http://www.joburg-archive.co.za)

The system is based on the Bogotá Transmilenio system model. Some of the design characteristics of Rea Vaya include: “constructing median busways rather than kerbside buslanes, closed stations with pre-board fare collection and verification, large bus vehicles [18m -160 passengers- articulated buses] to better match supply and demand and a centralised control center using vehicle control technology” (UNDP, 2007: 15-16), refer to a picture on the right hand bottom corner of Figure 13.

According to the City of Johannesburg IDP 2007/8, the Rea Vaya system will offer a rapid service that minimizes travel times. The closed stations will provide security (Closed Circuit Television cameras), comfort and convenience to the users and the pre-board fare collection system will facilitate rapid boarding, which will reduce dwell times at stations. It will also have an at-level platform to make the system accessible to the disabled e.g. those on wheel chairs. The system is envisioned to have high frequencies of 1 to 3 minutes and 10 minutes during peak and off-peak periods respectively.

It is expected to cost R2 billion - US\$ 282 million (funds sources include the national government, city government and donors like the Clinton Foundation etc) (Davie, 2007) and will be the first unsubsidized public bus system in the country. It is a Public Private Partnership. Private operators will be responsible for purchasing vehicles, and public funds will be used to purchase fare collection equipment and to build the required infrastructure. The system is expected to return a satisfactory profit to operators based on fares that maybe equal or a little bit higher than current fares and improved operating efficiencies (UNDP, 2007). It will operate for 18 hours a day (5:00 am to 12 midnight) and will be operated by private contractors to the City of Johannesburg (Transport Innovator, 2006). Buses will operate from about 150 stations, positioned half a kilometer apart and bus operators will be required to sign a contract specifying speeds and levels of service required; and will be paid a flat rate per kilometer travelled instead of being paid on the basis of the number of passengers transported (Davie, 2007).

Just like the Transmilenio, Rea Vaya will also make use of feeder services. It will be integrated into the broader transport picture with feeder routes being serviced by minibuses and taxis, linkages to the Gautrain network (Masondo- the Executive Mayor of the City of Johannesburg, 2007), metered taxis, pedestrian corridors, bicycles and private cars (the development of the park and ride facilities will make it much easier for private car users to transfer to public transport for their city travelling needs) (UNDP, 2007).

According to Masondo (2007), this efficient transport network will be supported by well maintained roads and high quality traffic signaling.

Just like in Bogotá, there will be no net job losses due to the coming in of the BRT system. In other words taxi operators will not lose their jobs because according to Stanway (the City of Johannesburg's Executive Director for Transportation), former taxi drivers will become bus operators or get involved in the maintenance of the new buses. Taxi operators will be encouraged to recapitalise their taxis, in exchange for a bus that will operate in the BRT system (Davie, 2007). However, it is important to make it clear at this point in time that just like in Bogotá where the traditional bus operators tried to resist/oppose the Transmilenio, fierce opposition may be created by existing taxi operators because of the uncertainties about the future.

The direct north-south corridor linking Soweto (where many workers live) and northern suburbs (where many employers are based) as well as the west-east corridor (Roodepoort –Alexandra via Randburg and Sandton) will benefit travellers in many ways (Thale, 2005). For example, presently commuters from Soweto to places like Sandton and Rosebank have to make use of more than one taxi, because they have to go via the City center to connect taxis to the northern suburbs. The reason being there are no direct taxis between these places. This as a result increases commuters' transport costs and creates unnecessary delays. According to the UNDP, "In practice, the efficiencies gained in developing a unified tariff network and dedicated infrastructure will actually result in overall lower fares to the customers that are now forced to pay multiple fares for a single destination since transfers are required" (2007: 16).

According to Davie (2005), the Rea Vaya brand will appear on taxis, buses and trains, and on the new bus and taxi stops. Refer to Figure 14 for a Rea Vaya bus and taxi.

**Figure 14: Rea Vaya bus and taxi**



Source: Davie 2005

## 6.4 Conclusion

Both the Transmilenio as well as the proposed/ envisaged Johannesburg system show some improvements as compared to the previous systems. In short they could be described as more reliable, safer and more efficient.

# Chapter 7

## Analysis of Research Findings

### 7.1 Introduction

This chapter analyses the research findings. The first section analyses the public transportation systems of the two cities in question. This is then followed by a section that deals with the effect of the Transmilenio on poverty levels. (In this chapter, please note that Bogotá's traditional public transportation system refers to that system before the Transmilenio). A section that summarises chapters five, six and seven through an evaluation matrix is the last section of the chapter before the conclusion.

### 7.2 Public transport in Bogotá and Johannesburg

Both the present Johannesburg and Bogotá's traditional public transportation systems can be classified as poor and inefficient to a large extent. In Johannesburg, the bus service provides a much better service compared to the taxis and the Bogotá traditional system. However, much focus shall be paid to the taxis since they are the widely used mode of public transport (72% of all public transport trips).

#### 7.2.1 Travelling times

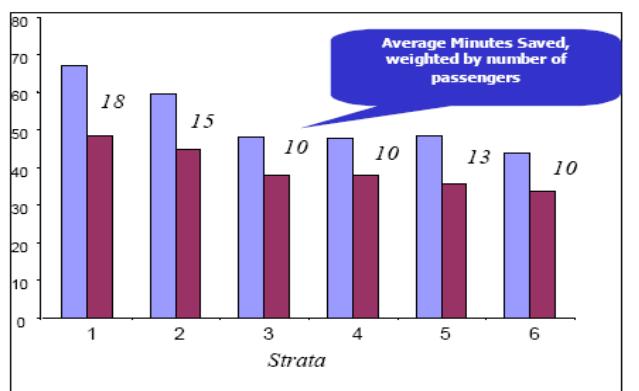
The traditional public transportation system of Bogotá was slow, so as present Johannesburg. For example, the public transport average journey time in one direction for Bogotá was 70 minutes and is 78 minutes for those who use more than one taxi in Johannesburg. Considering one aspect of the definition of an efficient public transportation system that was given by A Strategic Agenda for Transport in Gauteng (2005) that says: commuting time should not be more than 60 minutes in one direction; one can argue that there was not and is not an efficient public transport system in past Bogotá and present Johannesburg respectively. This is also true even if one takes the definition of an efficient public transport system by Johannesburg SDF (2006) that says: public transport has to be highly accessible if it is to be labelled efficient (see chapter

two). If accessibility means penetrating without delay, it then follows that an efficient public transport system has short commuting time(s)

Results of the study that was carried out in Germany in 2004 on life satisfaction show that an inefficient public transport system that forces people to commute for long hours to work makes people very unhappy than anything else in life (Montgomery, 2007). This Germany commuters' study that was carried out by psychologists confirmed that the longer people spent getting to work the lower their general life satisfaction tended to be (ibid). Commuting was also blamed for robbing people of time with their families and friends. The study also found that the depression brought on by long commuting hours was not being balanced by work satisfaction or higher incomes (ibid). In short, the Germany study suggests that long commuting hours are bad for human lives. Hence most of the pre-Transmilenio and present Johannesburg commuters were and are having an inefficient public transportation system that was and is impacting negatively on their quality of lives respectively.

The coming in of the transmilenio in Bogotá saw a reduction in the travelling times and cost. According to Martinez (2005 cited in Cain, Darido, Baltes, Rodriguez and Barrios, 2006), Transmilenio reduced average travelling time in the city by 13 minutes per trip. A study that was conducted by Yepes in 2003 found that the Transmilenio brought more benefits (in terms of traveling times) to the low income groups compared to the higher income groups, refer to Figure 15.

**Figure 15: Travel times before and after Transmilenio for different income groups**



Source: Yepes 2003 cited in Cain, Darido, Baltes, Rodriguez and Barrios, 2006

This is confirmed by an increase in the usage of the system by low income population between 2001 and 2003 i.e. from 17% to 37% (278,000 work day trips) (Hidalgo and Yepes, 2005). All this was possible because the system was designed with the poor living in the periphery in mind (*ibid*).

According to Hidalgo and Yepes (2005) phase one of the Transmilenio saw a total travel time saving of approximately 136.750 hours per day of which 23.6% of this was in the lowest two income strata. For example, Figure 15 above shows that the lowest income group i.e. strata 1 benefited the most because they saw a saving of 18 minutes because of the coming in of the Transmilenio. This is followed by strata 2 that saw a saving of 15 minutes and strata 6 is one of the groups that saw a relatively small benefit i.e. a saving of 10 minutes.

With travelling times reduced from 70minutes to 52 minutes (70 minus 18) for the poorest members of the society (strata 1), one can conclude that the Transmilenio is efficient in terms of travel times i.e. less than an hour in one direction.

To further support that the Transmilenio is efficient and benefited the poor to a large extent in terms of travel times, a 19-year-old Fabien Gonzales, one of the citizens of Bogotá pointed out that he used to leave home two hours before starting work, but it now takes him only 45 minutes because of the Transmilenio. He “takes home about \$238 a month and, like most of his neighbours, uses feet, bike and bus to get to work. He cycles from the periphery of the city to the Portal de las Americas [where he gets a Transmilenio service to the north end where he works], a transportation hub linking bike paths and pedestrian roads with the Transmilenio rapid-bus network” (Montgomery, 2007: no page).

### **7.2.2 Quality of service and vehicles**

The traditional Bogotá system used old uncomfortable buses and offered a poor service (e.g. no time table, integrated ticketing system and information for commuters). This is exactly the case in Johannesburg as was previously pointed out in chapter five. Most of the taxis are now old and offer a poor service. All these are signs of an inefficient public transport system according to A Strategic Agenda for Transport in Gauteng (see chapter 2).

If one takes the definition of an efficient public transportation system that was given by Owen (1966) and by A Strategic Agenda for Transport in Gauteng (2005) in chapter two, one can conclude that the Transmilenio is efficient in the sense of having modern buses that follow a timetable and have an integrated ticketing system.

### **7.2.3 Equality**

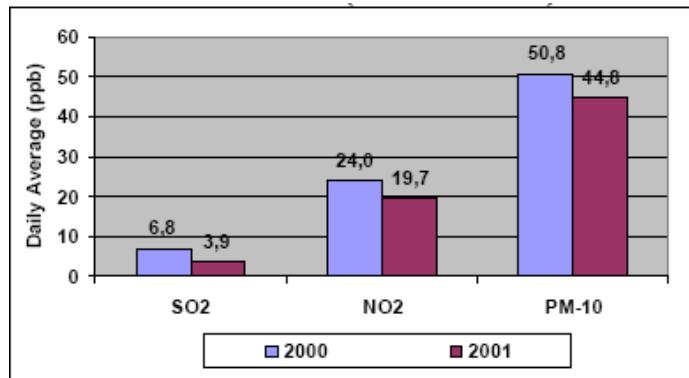
So far much of the transportation attention had been to the affluent who can afford private vehicles in Johannesburg. Very little has been done about the city's public transport that the less affluent rely on. This was the case with the traditional public transport system in Bogotá where 95% of road space was used by only 19% of the population. According to Mr. Peñalosa, former mayor of Bogotá, pedestrians and cyclists were seen as a nuisance by motorists and were regarded as the poorest of the poor (Montgomery, 2007). Coming in of the Transmilenio changed everything. Those on foot and bicycles now have respect. "So bikeways are important ... [because] they show that a citizen on a \$30 bike is equally important to someone driving in a \$30,000 car." (Mr. Peñalosa quoted in Montgomery, 2007). One can therefore conclude that the Transmilenio addressed the question of equality or social inclusion. Unlike the traditional Bogotá and present Johannesburg public transportation systems that excluded and exclude the low incomes respectively, the Transmilenio makes an effort to accommodate the poor and make them feel part and parcel of the society by making provisions for cycle tracks for bicycles and foot paths for pedestrians on foot.

### **7.2.4 Environmental Quality**

Air pollution is one of the problems that the city of Johannesburg wants to tackle (Johannesburg SDF, 2003). Although it is still continuing to find ways to lower its pollution levels, pre- Transmilenio Bogotá's pollution levels were a cause of concern just like in Johannesburg.

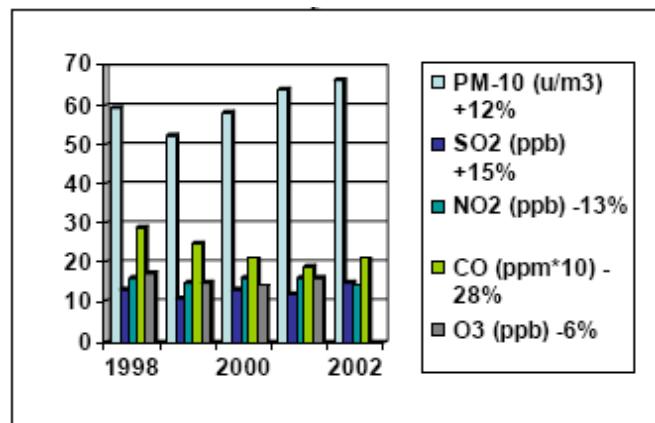
The Transmilenio managed to reduce the level of pollution in the city generally; refer to Figures 16 and 17 below. Figure 16 shows that the Transmilenio managed to improve the air quality along Caracas Avenue vicinity as there was a 43%, 18% and 12% reduction in Sulphur dioxide, Nitrogen dioxide and particulate matter respectively between 2000 and 2001.

**Figure 16: Impact of Transmilenio on air quality along the main Transmilenio corridor - Caracas Avenue**



Source: DAMA, Air Quality Monitoring Sistema, Station MMA Carrera 13 con Calle 39  
(in Cain, Darido, Baltes, Rodriguez and Barrios, 2006: 24)

**Figure 17: Impact of Transmilenio on Bogotá air quality**



Source: DAMA, Air Quality Monitoring Sistema, Station MMA Carrera 13 con Calle 39  
(in Cain, Darido, Baltes, Rodriguez and Barrios, 2006: 24)

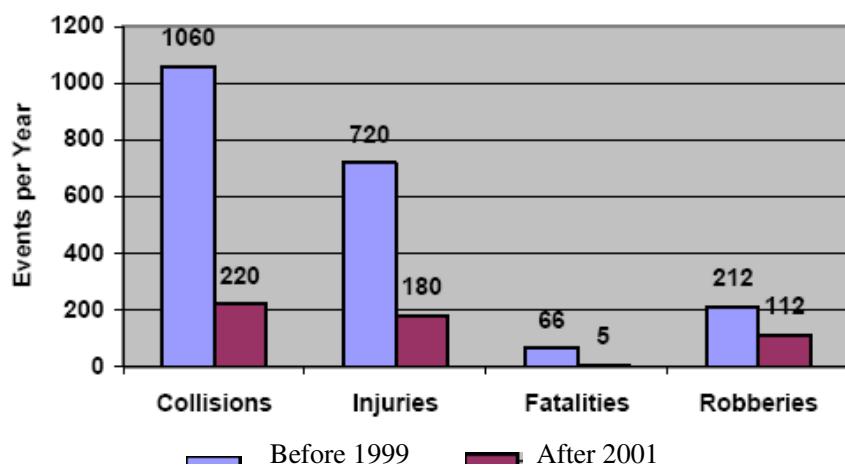
Although there was an increase of 12% and 15% of particulate matter and Sulphur dioxide respectively for the city as a whole between 1998 and 2002, the Transmilenio saw a reduction of the other three pollutants i.e. a 13% reduction in Nitrogen dioxide, a 28% reduction in Carbon monoxide and a 6% reduction in Ozone (Cain, Darido, Baltes, Rodriguez and Barrios, 2006), refer to figure 16 above. According to Montgomery (2007: no page), “the Transmilenio also [reduced] Bogotá’s carbon dioxide emissions by nearly 250,000 tons a year [and is] the first transport system to be accredited under Kyoto’s

Clean Development Plan". This supports the point, which was raised in chapter three under sustainability debate, that public transport is more environmentally sustainable compared to private cars. Its (public transport) use therefore benefits every living creature in terms of relatively clean air which doesn't affect their respiratory systems in a negative way.

### 7.2.5 Safety and security

Safety and security are of major concern in South Africa. The death toll on South African roads is extremely high compared to other countries. Crime is the order of the day. For example, one in four people are victims of crime each year (Allan, Gotz and Joseph, 2001). The sad part of it is that these problems mainly affect the poor who live in high crime zones (mostly low income settlements discussed above). Again it's the low income people who make use of taxis that were described as unsafe because of poor driving habits and their age. The traditional public transport system of Bogotá used to experience the same problems. However the implementation of the Transmilenio reduced these problems to a great extent, refer to Figure 18.

**Figure 18: Accidents and robberies on the Transmilenio corridors**



Source: STT and Metropolitan Police Department (in Cain, Darido, Baltes, Rodriguez and Barrios, 2006: 15).

Figure 17 above shows that the Transmilenio reduced the number of collisions, injuries, fatalities and robberies by 79%, 75%, 92% and 47% respectively. A reduction in the

number of collisions which in turn led to few injuries and fatalities can be attributed to the Transmilenio that saw the implementation of busways, footbridges (that reduced pedestrian vehicle conflict) and the law that required Transmilenio drivers to be trained. In Farris and Harding (1976)'s view, the Transmilenio is a success because it operates in a good regulatory system (refer to chapter two - passenger transportation system).

Crime reduced to a great extent as a result of the increased visibility of police officers on Transmilenio stations (Cain, Darido, Baltes, Rodriguez and Barrios, 2006). According to Montgomery (2007: no page), Mr. Peñalosa the former mayor of Bogotá "really does seem to have made Bogotans [both poor and rich] happier [because] the murder rate fell by an astounding 40 per cent during his term and has continued to fall ever since. So have the number of traffic deaths". Traffic deaths declined by 6.9% between 2001 and 2002 and most of these were pedestrian (63%), followed by passengers of motor vehicles i.e. 12% and cyclists (11%) (Hidalgo and Yepes, 2005). Although "there is no socio-economic breakdown of these death figures, but most pedestrian and cyclist victims of traffic accidents are poor" (*ibid*: 5).

If one takes the definition of an efficient public transport system by Owen (1966) and A Strategic Agenda for Transport in Gauteng (2005) that argues that the system has to be safe and have low rates of pilferages and damage, one can conclude that the pre-Transmilenio and present Johannesburg public transportation systems were and are not efficient because these problems were in Bogotá and are in Johannesburg the orders of the day.

On the other hand the Transmilenio can be considered to be efficient because it is continuously reducing these problems. Increased safety and security, because of the Transmilenio saw an increase in the number of people (including the vulnerable) using public transport in Bogotá. This supports Oc and Tiesdell (1997)'s view (see chapter three) that certain style of management and security systems reduce space exclusion; as opposed to Church et al (2000) who argue that contemporary security and space management socially exclude certain individuals from using certain public spaces

## **7.3 Poverty levels**

### **7.3.1 Construction phase**

Information available suggests that the Transmilenio played a role in reducing poverty levels of Bogotáns. Just like any other third world country/city, Colombia/Bogotá does not afford highly sophisticated machinery for construction like those found in developed countries like Canada, the USA etc. It (Bogotá) has to rely on manual labour or machinery that will require some input of manual labour at some point in time – labour intensive methods of construction. This means the construction of the Transmilenio created jobs both skilled and unskilled. It is estimated that 13,000 people were directly involved in the first stage of infrastructure construction works, with an investment of approximately US \$7 million per kilometre. (<http://www.transmilenio.gov.co>). The second stage of the Transmilenio was completed last year, third phase plans are now at an advanced stage and there are plans to construct more routes. This means more people will continue to get jobs if labour intensive methods of construction are going to be used.

Studies proved that the poor who normally does the unskilled work tend to benefit where labour intensive methods of construction are used. For example, according to McCutcheon (1993) the construction of the 14 000kms of Kenyan rural access roads between 1975 and 1982 resulted in the creation of 84 000 years of casual employment and 6000 years of supervisory employment. This is also the case with Botswana where the construction and maintenance of district roads created a lot of employment especially for the non skilled labourers who are the poor (McCutcheon, 1992).

The fact that there were more jobs on the market, because of the Transmilenio construction, increased the poor's choice of work they could do. One can therefore conclude that the Transmilenio played a role in reducing poverty levels of Bogotáns.

### **7.3.2 Transmilenio in Operation**

A debate about whether an efficient public transportation system contributes to poverty or not was raised in chapter three (under geographical exclusion subsection). Campbell (1993) and Bartley (1998) rightly pointed out that poor transport networks contribute to or exacerbate the poverty situation. This is contrary to the views of Vrychea and Galemis (1998) and Grieco (1994) who argue that improved transport networks could actually

disadvantage the poor in a particular area. In this case, Campbell and Bartley were right because according to Hidalgo and Yepes (2005) the Transmilenio and its associated non-motorized (pedestrianised streets and cycle tracks) transportation improvements was able to reduce social exclusion by improving the level of access between the city's centrally located employment centres and its deprived, peripheral areas.

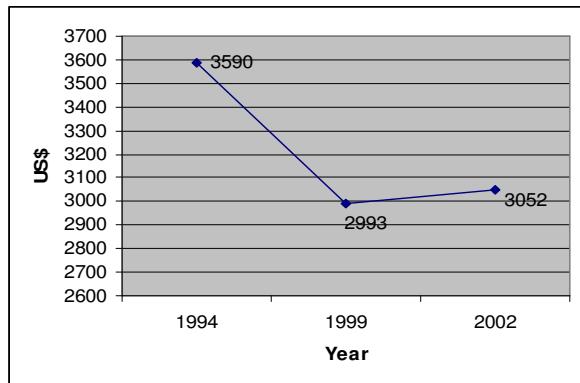
The Transmilenio has a feeder system that works to the advantage of the people who live in the periphery, because they (people who live in the periphery) do not have to pay additional fares to board feeder services that transport them to the main corridors. As of February 2007, once they payed 1,300 pesos, or roughly US\$0.55, passengers could travel anywhere in the system without paying any transfer fees ([www.gobrt.org](http://www.gobrt.org), 2007). The system works in such a way that the better-off (who usually travel short distances) subsidises the poor who have to travel longer distances. Unlike the distance based fare, the Transmilenio works to the advantage of the poor. It passed the poverty alleviation litmus test; because it benefited and is still benefiting the poor as compared to projects that used to benefit the rich only in the past Cervero (2005ii cited in Cain, Darido, Baltes, Rodriguez and Barrios, 2006). The issue of a project structured in such a way that it benefits everyone supports the view by Knowles and Hall (1992) and Mohan (2002) (see chapter three –the role of the state section) that subsidies are always needed if a public transport system is to benefit every member of the society. It does not matter where the subsidies are coming from, but the bottom line is that they are required.

Although the fare charged by the Transmilenio system is slightly more (exceeds by only 6%) compared to the average fare of the traditional system. One can argue that it is actually cheaper in real terms because it is used to provide a quality service, which was not found in the traditional system where a service was usually offered in poor quality conditions in buses averaging 14 years of age; and where fares were always on an increase compensating for low rider ship per bus (<http://www.transmilenio.gov.co>). This traditional system of Bogotá confirms the point that was raised by Friends for the Earth Scotland (2003) in chapter three that an inefficient public transport system can be more expensive compared to private car use.

To support the point mentioned earlier that an efficient public transport system can help lower poverty levels, there is evidence that per capita income as well as poverty levels

improved in the city of Bogotá after the implementation of the Transmilenio. Refer to Figures 19 and 20 for the graphs of per capita income and poverty levels in Bogotá respectively.

**Figure 19: Gross Domestic Product (GDP) per capita for Bogotá**

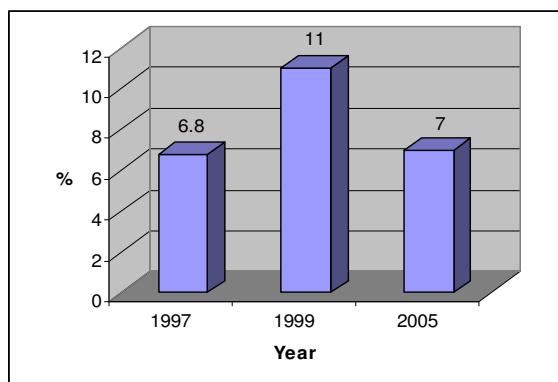


Source: author after Cain, Darido, Baltes, Rodriguez and Barrios, 2006

Figure 19 above shows that per capita income for Bogotá was high in 1994 (US\$ 3,590) and went down to US\$ 2,993 in 1999 because of the economic recession in that year. The figure went up to US\$ 3,052 in 2002 after the implementation of the Transmilenio.

Considering the benefits of the Transmilenio that were discussed above one can therefore conclude that it (Transmilenio) played a part in raising the per capita income figure of the city.

**Figure 20: Percentage of people living below US\$1/person/day in Bogotá**



Source: author after Cain, Darido, Baltes, Rodriguez and Barrios, 2006

This is also the case with the poverty levels in the city (Figure 20). In 2005, there were few people (7%) living below the poverty line of US\$1/person/day as compared to 11%

in 1999. This can be attributed to the fact that more people are now earning an income as a direct or indirect result of the Transmilenio. For example, as was mentioned above the construction of the system employed and is still employing a lot of people and this help to raise people's incomes. The Transmilenio also reduced social exclusion; hence those who were previously finding it difficult to travel to places of economic opportunity are now finding it much easier to travel to areas with jobs - and raise their income levels.

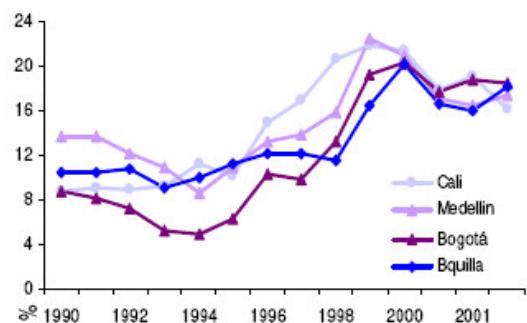
This was also the case with poverty levels in Curitiba that has a BRT system that the Bogotán Transmilenio model is based on. Planners in Curitiba recognised that an integrated public transportation system could serve as the backbone for the development and growth of the city and could lower its poverty levels ([www.solutions-site.org](http://www.solutions-site.org)). This came out to be true, because this municipality with 1.6 million people (Macleod 2002) has a transportation system that actively helped and continues to help residents obtain the benefits of growth, including access to jobs, homes, recreation, and other elements of the urban community (Rabinovitch and Hoehn, 1995). This transportation system in Curitiba helps solve the problem of social exclusion. For example, the Southeast to Boqueirão transit corridor saw the social inclusion of the poor who were predominantly located in the south of the city (Charlesworth, 2005). Poverty levels in the city were also greatly reduced mainly because of this corridor also referred to as a 34km employment line. A lot of people were employed during its construction (i.e. to do construction and related work) and after since there is a lot of business related activities along it (ibid).

To further support the point that the Transmilenio played a role in reducing poverty levels in Bogotá, let us have a look at the following three graphs i.e. Figures 21, 22 and 23. These graphs show the unemployment rate, percentage of people living below the poverty line and people's perception of security of Colombia's four largest cities. Figure 21 shows that Bogotá and Cali are the only cities that saw a decline in the unemployment levels between 2001 and 2002. The other two cities i.e. Medellin and Barranquilla actually saw an increase in the unemployment rate between this period. Figure 22 shows that of the four biggest Colombian cities, Bogotá had the lowest number of people living below the poverty line in 2002. Finally Figure 23 shows that Bogotá and Cali are the only two cities that experienced a fairly steep rise in the number of people who perceive the cities as safe between 2001 and 2002. Although the other two cities have higher percentages (compared to Cali and Bogotá) of people who perceive them as safe, there was a decline

(all in all) in the number of people who still saw them as safe between this period in question i.e. 2001 to 2002. In all these cases, Bogotá was doing fine or showing an improvement as compared to other big Colombian cities.

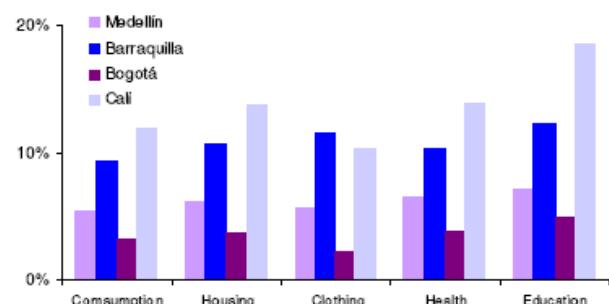
Although there is a possibility that the improvements in Bogotá were because of the general national economic growth as well as the fact that it is the capital city where all the development happens (see chapter 4), one could argue that there is a chance that the Transmilenio played a role since the improvements happened during the Transmilenio times.

**Figure 21: Unemployment rate by city 1990-2002**



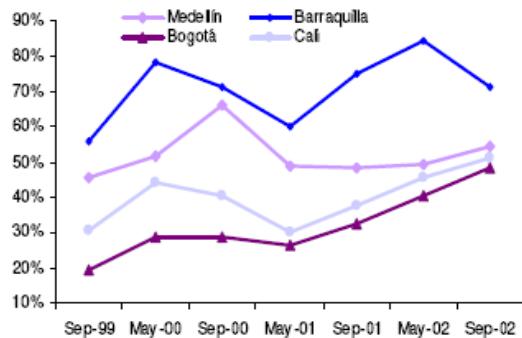
Source: DANE (in Reyes, 2004)

**Figure 22: Subjective poverty line by city, Sep 2002**



Source: Social Survey from Fedesarrollo (2002 in Reyes 2004)

**Figure 23: Perception of security by city**



Source: Social Survey from Fedesarrollo (1999- 2002 in Reyes 2004

## 7.4 A summary of research findings

Table 3 below is an evaluation matrix that summarise the characteristics of both the traditional and present transportation system in Bogotá and the present as well as the proposed public transportation system in Johannesburg. In short, it is summary of the whole chapter i.e. analysis of research findings.

**Table 3: An evaluation matrix**

Criteria	Bogota		Johannesburg	
	Traditional	Transmilenio	Present	Proposed
Travelling times	1	4	2	4
Quality of service	1	4	1	5
Quality of vehicles	1	5	1	5
Equality	2	3	2	3
Environmental quality	1	3	1	4
Safety and security	1	4	1	3
Cost/passenger for the entire journey	1	3	2	3
Number of passengers/trip	1	4	2	4

Key

- 1- Poor, (below standard)
- 3- Good, (slightly above average)
- 5-Excellent, (perfect situation)

- 2- Fair,(average)
- 4- Very good, (way above average)

Source: Author

## **7.5 Conclusion**

The Transmilenio brought about recognisable positive results which have had an effect either directly or indirectly on poverty. Some of the positive results associated with it are reduced travelling times, a quality service and vehicles, it promotes equality, it is relatively environmental friendly, it offers more safety and security and it reduced poverty levels since it increased choice for the poor.

# **Chapter 8**

## **Lessons for Johannesburg and Conclusion**

### **8.1 Introduction**

There are quite a number of lessons to be learnt by Johannesburg from cities that implemented an efficient public transportation system (BRT to be specific). However there are two most important broad lessons that Johannesburg needs to realise. The first one is that most BRTs succeed because of other supporting factors that will be in place. In other words the success of a BRT system depends on conditions in which it is being implemented. The other lesson is that public transport does not lower poverty levels on its own. There has to be other strategies to work hand in hand with it in order to see poverty levels going down.

First section of this chapter discusses the conditions that normally lead to the success of BRTs; and the second section deals with the other strategies that need to work hand in hand with public transport in order to see poverty levels going down.

### **8.2 Conditions/factors in Place that Saw the Success of the BRT**

As was discussed above, Information available suggests that the Transmilenio helped lower poverty levels of Bogotá. The swift implementation of the Transmilenio was possible because of a number of reasons and these include: a “strong political resoluteness,....., significant financial support and most important, the hard work and great efforts of a committed and enthusiastic technical team” etc

(<http://www.transmilenio.gov.co>: no page)

#### **8.2.1 Strong political firmness**

According to Walter Hook, of New York's Institute for Transportation and Development Policy (ITDP), most mayors who came before Peñalosa were not brave enough to implement policies that were in favour of public transport because of the fear that

motorists would rebel politically (Montgomery, 2007). As a result there were no or very little worldwide recognized public transport improvements in the city. Peñalosa came in as the mayor of Bogotá in 1998 and took a strong political stand in favour of public transport. Even though his term of office ended in 2000, the Transmilenio project still continued because his successors Antanas Mockus and Luis Garzón continued the implementation of the project despite the tremendous opposition especially from the traditional public transport operators and other motorists (Ardila, 2005).

The big lesson for Johannesburg here is that: political leaders (Mayors) have to take a firm stand when it comes to the implementation of public transport systems like the BRT system that is to kick start in 2008. It is recommended that the mayor(s) who will come after Mayor Masondo have to support the implementation of public transport project(s) rather than making drastic changes all in the name of gaining political votes. Political leaders with people at heart are supposed to take decisions that are sustainable –lead to long term benefits just like in Bogotá and Curitiba.

One might argue that countries like Brazil did not have the same level of democracy then, as compared to present Johannesburg, when they implemented their BRT system. Hence it was possible to '*impose*' some policies and this is a bit difficult in South Africa that calls itself a democratic country where everyone has the right to participate in decision making. It is therefore recommended that with regard to this BRT project, the government does not have to impose anything because it will be totally resisted like the mono rail project by Malaysians, but should always refer back to the planning process (see chapter 3, the social exclusion section).

### **8.2.2 Significant financial support**

The Transmilenio was a success because the city government was able to tap different sources of revenue to fund its expenditures. Some of its sources of income include taxes, transfers from the national government, loans and capital revenues etc (Adila 2005). For example, sources of revenue for the construction of phase 1 of the Transmilenio were 46% local fuel taxes, 20% national government grants, a 6% World Bank loan and 28% other local funds (Cain, Darido, Baltes, Rodriguez and Barrios, 2006).

Therefore the lesson for Johannesburg is that the proposed BRT will only be a dream comes true if there are adequate resources to undertake the project (Piennar, Krynaauw and

Perold, 2005). The city has to make sure that it has more than one reliable source of funding and it has to start thinking of other sources if in doubts. Other sources include getting loans from both local and international lending institutions, fuel taxes etcetera .

### **8.2.3 Technical capacity**

Transmilenio was a success because of the hard work and great efforts of a committed and enthusiastic technical team that was assembled by Peñalosa. The team had a high level of technical (to engineer a highly complex project and to ensure that the private sector could invest in the buses and operate them) and political capacity (to negotiate with the existing bus companies and convince them of becoming Transmilenio operators) (Adila 2005).

Johannesburg has to take this point seriously considering the shortage of skills in the country. It also needs both technical (to engineer the complex BRT system project) and political (to negotiate with current taxi operators to become Rea Vaya operators) capacity. There are very few engineers in the country and the problem is exacerbated by the fact that there are few students studying the discipline partly because of apartheid that used to discourage blacks from taking science subjects. Just like any other African country, South Africa is also suffering from brain drain because educated people are leaving the continent for the west in search for greener pastures. Other than the shortage of engineers, the country has also a great shortage of planners (Berrisford, 2006).

According to Stanway, the City of Johannesburg transportation department has 25 professionals and there are plans to raise the figure to 55 in future (Davie, 2007).

Considering the serious shortage of transport engineers and planners in the country, the city has to start thinking seriously of where it is going to source these skills from. The implementation of the BRT is supposed to start next year and there is no way the city or country will train enough skills within this short space of time. It is therefore recommended that the city or country has to start thinking of importing these skills from countries where there is excess.

### **8.2.4 Strong government agency and operators**

Transmilenio was a success partly due to both the strong operators and a strong Government agency—Transmilenio Co that were/are in place. If both were not strong,

then power imbalances could have developed leading to either the capture of the agency by vested interests or opposition to any government effort to reform the traditional system (Adila, 2005). Weak agencies like the STT are not likely to see any positive public transportation results.

Johannesburg has to learn from this. Uncertainty about the future by the taxi industry is likely to lead to opposition of the BRT. The city has therefore to put in place a strong government agency and operators if it wants to see the success of the BRT. The agency has to be able to supervise, control and enforce regulations.

### **8.2.5 Crime**

Crime and death rates along the Transmilenio corridors dropped to significant levels after the implementation of the system. As was discussed above, this was mainly due to increased visibility of guards on Transmilenio stations. One can argue that this is one of the reasons why rider-ship increased along the corridors. For example the system and other transport plans increased the transit mode share from 64% in 1999 to 70% in 2005. Ridership was 1 050 000 in January 2006 and is expected to be 1.4 million passengers per day once phase three is fully operational. An increase in rider-ship means more money for the operators hence they will be able to stay in business providing an efficient service.

It is therefore recommended that Johannesburg has to reintroduce and implement more measures that will lower crime and accident rates in the city if it wants its BRT to be used effectively as in present day Bogota. Such measures include reintroducing and increasing the visibility of metro police on its BRT stations, installing Closed Circuit Television (CCTV) cameras and well lit subways. This will build a sense of safety for the users and will encourage more people to use the facility/system. Hence the system will have enough demand and will continue to operate unsubsidised as planned. The key is in attracting as many users as possible so that operators will not be operating at a loss.

### **8.2.6 Affordability**

According to Piennar, Krynauw and Perold (2005) public transport must cater for all income groups to be effective. Both the BRT systems of Bogotá and Curitiba have feeder systems and are affordable to all income levels, thus why they are labelled successful.

Since phases 1 and 2 of the Johannesburg Rea Vaya BRT system are aimed at catering for the low income areas (e.g. Alexandra and Soweto), it is highly recommended that the system has to be affordable to all income groups otherwise it will only be used by a few people, hence its failure. As was discussed in chapter two and three, this can only happen when the government plays a role. For example in Curitiba and Bogotá, the government(s) did not assume a back seat position, but these cities' governments played a significant role in the provision of infrastructure and have a say in the systems, hence public transportation systems that benefit all citizens. The city government of Johannesburg has to be seen playing a role in the implementation of the system if it wants the system to benefit all its citizens especially the poor in peripheral areas. Johannesburg has to plan its ticketing and fare structure in such a way that there is cross subsidisation (e.g. an integrated ticketing system so that those who travel long distances will be subsidised by those who travel short distances) in order to benefit the poor. In short, the BRT system has to be under the oversight of the government.

### **8.2.7 Modal Integration**

A well integrated transportation system is likely to lead to the success of public transport. For example, in Bogotá there are cycle tracks, pedestrian ways that link to the Transmilenio system. These non-motorised spaces are well maintained and safe; hence a lot of people use them to link to the Transmilenio. Hence the Transmilenio is efficient according to Johannesburg SDF (2006), because it supports a range of modes.

Johannesburg has to do the same if it wants its BRT system to be well utilised. It has to plan and implement pedestrian ways and cycle tracks that link to its BRT system. This will encourage people from the peripheral areas like Orange farm to cycle or walk to Soweto where they will be able to catch the buses to their places of work in the north of the city or CBD.

## **8.3 Other strategies to work with public transport**

Although the information available suggests that the Transmilenio helped lower Bogota's poverty levels, as was pointed out in chapter two and three, Hidalgo and Yepes (2005) point out that even though job opportunities became closer because of the Transmilenio,

not every poor person in the periphery benefited - because of, for example, comparatively low levels of education of these people. This suggests that an efficient public transport system cannot hundred percent solve poverty problems on its own, but there has to be other strategies to work hand in hand with it.

### **8.3.1 A sound decision-making process**

Like any developing world city, Bogota was facing transport problems like congestion and the Japanese International Co-operation Agency prescribed a vast network of elevated freeways as a solution to the problem (Montgomery, 2007). This plan needed a lot of money. Instead of following the Japanese advice, Mr. Peñalosa decided to take the public transport route and other measures (supporting schools, libraries, parks, bike routes and the world's longest pedestrian freeway) that were of more benefit to the poor (*ibid*). “.... by shifting the budget away from private cars, Mr. Peñalosa was able to boost school enrolment by 30 per cent, build 1,200 parks, revitalise the core of the city and provide running water to hundreds of thousands of poor” (Montgomery, 2007: no page).

It is therefore recommended that Johannesburg should not look up to the North for solutions but should also start thinking of tailor-made solutions that can work for the city (e.g. finance wise).

As was pointed out in chapter three (social exclusion section), in addition to providing public transport, Johannesburg also has to continue implementing other strategies (e.g. the other GDS eleven sector plans – see chapter one) if it wants its poverty levels to go down. In other words, poverty has to be seen and tackled holistically and as a cross cutting issue. This is what Bogotá did. Instead of just implementing the Transmilenio, it also looked into other areas like education, providing services like water etc. All these efforts benefited the poor at the end of the day.

### **8.3.2 Labour intensive methods of construction**

As was discussed in the previous chapter, the construction of the Transmilenio generated employment for a lot of people. Johannesburg should take the construction of the Rea Vaya BRT as an opportunity for reducing its unemployment level which stands at 27%. However, the city has to note that it has to make use of more manual labour as compared to machinery. Machinery should only be used where it is not possible or cost effective to

use human labour. Unskilled labour is available so why not make use of the resources that the country has and reduce poverty levels by so doing. In addition to using manual labour, it is recommended that the city has to specify the areas where unskilled labour will come from. For example specifying that manual labour for the BRT and other major construction works like the Gautrain will have to come from poor areas of Johannesburg like Orange farm, Soweto and Alexandra, Diepsloot and Ivory Park; and that no other person from other areas to be employed.

### **8.3.3 Type of message to the public**

Just like Burchardt et al (1999) (see chapter three – social exclusion section) who believe that one way of solving the issue of social exclusion and poverty is by promoting citizenship, Mr. Mockus, Peñalosa's successor convinced the people of Bogotá that it was their duty to take care of each other. “Inspired by his anti-corruption campaign and message of citizenship, 63,000 families volunteered to pay 10 per cent more than their assessed property tax. By the end of his term, tax revenues had tripled” (Montgomery, 2007: no page). Some of this money was used to construct a pedestrian-only avenue in an area where most of the poor reside. Some of these people include the refugees from all over the country who come to the city to seek refuge (*ibid*). This money is improving the quality of life of these poor people.

This is a good thing for Johannesburg to copy considering the gap between the rich and the poor in the city and country as a whole. The situation presently is that those who are rich are rich for sure and the poor are really poor. It will be a good idea for the city officials to preach about citizenship and inspire the rich to help those in need. The news can be sent out to the public via media and other means (e.g. during imbizos)

## **8.4 Conclusion**

This research report has been trying to explore the following question: What is the effect of an efficient public transportation system on poverty levels? Information available suggests that there isn't a straightforward relationship between poverty and accessibility although public transport has a role to play in poverty reduction.

However, in order to see positive results, it is suggested that implementers of a public transport project have to correctly identify conditions that will make it possible to implement the project in the first place; and there also has to be other strategies in place to support it (public transport). In other words, since poverty has a lot of cause as pointed out in chapter two, it has to be treated as a cross cutting issue that needs more than one strategy or department to solve it. An efficient public transportation system alone is too small for this complicated poverty issue.

## References

- Allan, K; Gotz, G and Joseph, C (2001), *Johannesburg: an African city in change*, Zebra Press, Johannesburg
- Amartya, S (1999). *Development as freedom*, Oxford University press, Oxford
- A Strategic Agenda for Transport in Gauteng (2005). Gauteng Department of public Transport, Roads and Works.
- Banister, D (2005). *Unsustainable Transport: City transport in the new century*, Routledge, London
- Berrisford, S (2006). "Towards a JIPSA Business Plan for strengthening urban planning skills in South Africa", report prepared for JIPSA Technical Working Group.
- Blunden, W. R (1971). *Land-use/Transport system*, Pergamon Press, Oxford
- Case, K.E and Fair, R.C (1996). *Principles of Economics*, Prentice-Hall, New Jersey
- Charlesworth, E (2005). *City Edge : Case Studies in Contemporary Urbanism*. Architectural Press, London
- Church, A. Frost, M and Sullivan K, (2000). Transport and social exclusion in London. *Transport Policy* 7 (2000)195-205, London
- City of Johannesburg Integrated Transport Plan (ITP) 2003-2008 Executive Summary
- City of Johannesburg Spatial Development Framework (SDF) 2006/7, Johannesburg
- City of Johannesburg, Spatial Development Framework (SDF), 2003
- City of Johannesburg, Spatial Development Framework (SDF), (2006).
- Constitution of the Republic of South Africa (1996), Pretoria
- Farrington, J (1992) Transport environment and Energy. In Hoyle B S and Knowles R D (1992) eds. *Modern Transport Geography*, Belhaven Press, London.
- Farris, M.T and Harding, F.E (1976). *Passenger Transportation*. Prentice-Hall, Inc., Englewood Cliffs, New Jersey
- Haefner, L.E (1986). *Introduction to Transportation Systems* CBS College publishing, New York

Haughton, G and Hunter, C (1994). *Sustainable Cities*. Regional Policy and Development Series 7. Regional Studies Association, Jessica Kingsley publishers, London

Hoyles, B and Knowles, R (1992). Transport Geography: an introduction. In Hoyle B S and Knowles R D (1992) eds. *Modern Transport Geography*, Belhaven Press, London

Huchzermeyer, M (2002). Informal settlements: production and intervention in twentieth century Brazil and South Africa. *Latin American Perspective* 29(1)

Iles, R (2005). *Public Transport in Developing Countries*, Elsevier Ltd, London

Ivory Park ward 77 field survey results (2006). Research conducted by author and other development planning students for Technology and Techniques of Development planning course. University of the Witwatersrand, Johannesburg. Unpublished paper

Joburg 2030. City of Johannesburg, Johannesburg

Knowles, R and Hall, D (1992). Transport Policy and Control. In Hoyle B S and Knowles R D (1992) eds. *Modern Transport Geography*, Belhaven Press, London

McCutcheon, R.T (1993). *Kenya: The Rural Access Roads Programme 1974 to 1986*. Orientation Course on Labour-based Roads Engineering: Section 3.2: Case Studies DELFT: IHE

McCutcheon, R.T (1992). *Botswana: A description of the District Roads Labour-intensive Improvement and Maintenance Programme*. Development Southern Africa Volume 9, 3August

Mohan, J (2002). Geographies of welfare and social exclusion: dimensions, consequences and methods. *Progress in Human Geography* 26,1 . Department of Geography, University of Portsmouth.

Muller, J (1992) From survey to strategy:twentieth century developments in western planning method. *Planning Perspectives*, 7 (1992). Department of Town and Regional Planning, University of the Witwatersrand, Johannesburg .

Nash, C.A (1976). *Macmillan studies in Economics: Public versus Private Transport*, The Macmillan Press Ltd, London

Nixson, F (1996), *Studies in the UK Economy: Development economics*, Heinemann Educational Publishers, Oxford.

O'Flaherty, C.A (1986). *Traffic Planning and Engineering*, Edward Arnold, London

Owen, W (1966) *Strategy for mobility: Transportation for the Developing Countries*. East-west Center Press, Honolulu

Schwartz, H (2004). *Urban Renewal, Municipal Revitalization: The Case of Curitiba, Brazil*, Library of Congress, Alexandria

Simpson, B (1987). *Planning and public transport in Great Britain, France and West Germany*, Longman House, Harlow

Statistics South Africa Census (StatsSA) (2001). Pretoria

Teixeira, A.E (1990). A critical analysis of the Edenvale public transport system. Discourse submitted to the Faculty of Architecture, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the Degree of Bachelor of Science in Quantity Surveying, Unpublished.

Tolba, M.K (2001) *Our Fragile World Challenges and Opportunities for Sustainable Development*, Eolss, Oxford

Turton, B and Knowles, R (1992) Urban Transport Problems and Solutions In Hoyle, B.S and Knowles, R.D (1992) eds. *Modern Transport Geography*, Belhaven Press, London.

UNCHS (Habitat) (2001). *Cities in a globalising World: Global Report on Human Settlements, 2001*. United Nations Centre for Human Settlements, Nairobi pp 114-125.

UN-Habitat (2003). *The challenge of Slums: Global Report on Human Settlements*. United Nations Human Settlement Programme, Nairobi

Wells, G.R (1975). *Comprehensive Transport Planning*, Charles Griffin and Company Ltd, London

White, H. Killick, T (2001). *African Poverty at the Millennium: Causes, Complexities, and Challenges*. The World Bank, Library of Congress Cataloging-in-Publication Data, Washington DC.

Zhang, Q (1999), High rise and high density compact urban form: The development of Hong Kong in Jenks, M and Burgess, R. (2000), *Compact Cities: Sustainable urban forms for developing countries*, Spon Press, London

## Internet references

Allaop, R (2006). Public transport debated: more sustainable, less gimmicks.  
<http://www.ipa.org.au/files/58-2-ALLSOP.pdf> accessed on (13/04/07)

Bogota Transmilenio, (2007). <http://www.gobrt.org/Transmilenio.html> (18/06/07)

Bogota Wikipedia, the free encyclopaedia  
<http://en.wikipedia.org/wiki/Bogot%C3%A1> (18/06/07)

Cain, A. Darido, G. Baltes, M. R. Rodriguez, P and Barrios, J. C (2006). Applicability of Bogota's Transmilenio BRT system to the United States  
[www.nbrti.org/media/documents/Bogota%20Report\\_Final%20Report\\_May%202006.pdf](http://www.nbrti.org/media/documents/Bogota%20Report_Final%20Report_May%202006.pdf)  
(10/06/07)

City of Johannesburg Integrated Development Plan (IDP) 2006-11  
[http://www.joburg-archive.co.za/2006/pdfs/idp\\_2006/ch5\\_spatial.pdf](http://www.joburg-archive.co.za/2006/pdfs/idp_2006/ch5_spatial.pdf)(29/08/06)

City of Johannesburg Integrated Development Plan (IDP) 2007/8  
[http://www.joburg.org.za/city\\_vision/idp\\_2007.stm](http://www.joburg.org.za/city_vision/idp_2007.stm) (25/06/07)

City of Johannesburg, Growth and Development Strategy (2006).  
<http://www.joburg.org.za/2006/may/budget.stm>. (30/07/2006)

Davie, L (2005) Rea Vaya: Putting Joburg on the move  
[http://www.joburg.org.za/2005/dec/dec19\\_vaya.stm](http://www.joburg.org.za/2005/dec/dec19_vaya.stm) (25/06/07)

Davie, L (2007) Bob Stanway puts Joburgers on the bus.  
[http://www.joburg.org.za/2007/mar/mar26\\_bobstanway.stm](http://www.joburg.org.za/2007/mar/mar26_bobstanway.stm) (25/06/07)

Efficient Transportation for sustainable urban planning in Curitiba  
[http://www.solutions-site.org/cat7\\_sol110.htm](http://www.solutions-site.org/cat7_sol110.htm)

Friends of the Earth Scotland (2003). Executive debate on Transport  
<http://www.cheaperbycar.co.uk/> (9/19/07)

Gilbert, A (1996) Santa Fé de Bogotá: A Latin American special case  
<http://www.unu.edu/unupress/unupbooks/uu23me/uu23me0s.htm> (18/06/07)

Hamre, B (2007) City of contrasts, city of history  
<http://gosouthamerica.about.com/cs/southamerica/a/ColBogota.htm> (08/06/07)

Jacobs, I (2005). No debate on increasing investment in public transport, says Radebe  
<http://www.gpg.gov.za/docs/nz/2005/nz1020b.html> (9/19/07)

Johannesburg's Growth and Development Strategy (GDS) (2006).  
<http://www.joburg.org.za/2006/may/budget.stm>. (30/07/2006)

Johannesburg wikipedia free encyclopedia 2007  
<http://en.wikipedia.org/wiki/Johannesburg> (18/06/07)

Luckhurst, T (2006) Sorry – Horses and Motorbikes just don't mix, Independent, The (London). [http://findarticles.com/p/artiles/mi\\_qn4158/is\\_20060613ai\\_n16474993](http://findarticles.com/p/artiles/mi_qn4158/is_20060613ai_n16474993)

Macleod, K (2002). Curitiba: orienting Urban Planning to Sustainability. International Council for Local Environment Initiatives (ICLEI), Case Study 77 Toronto  
[www.resourcesaver.com/file/toolmanager/CustomO86C299F62933.pdf](http://www.resourcesaver.com/file/toolmanager/CustomO86C299F62933.pdf) (15/03/07)

Making the Connections: Final Report on Transport and Social Exclusion Summary (2002). [www.socialexclusionunit.gov.uk/downloaddoc.asp?id=228](http://www.socialexclusionunit.gov.uk/downloaddoc.asp?id=228) (18/06/07)

Masondo, A (2007). State of the City Address by the Executive Mayor of

Johannesburg, Johannesburg  
[http://www.joburg-archive.co.za/2007/pdfs/state\\_of\\_city.pdf](http://www.joburg-archive.co.za/2007/pdfs/state_of_city.pdf) (18/06/07)

Montezuma, R (2005). Global Urban Development Magazine, Facing the Environmental Challenge, The Transformation of Bogota, Colombia, 1995-2000: Investing in Citizenship and Urban Mobility, Volume 1, Issue 1, May 2005.  
[http://www.globalurban.org/Issue1PIMag05/Montezuma%20article.htm#Volume\\_1](http://www.globalurban.org/Issue1PIMag05/Montezuma%20article.htm#Volume_1)  
(1/04/07)

Montgomery, C (2007). Saturday's Globe and Mail: From living hell to living well: A radical campaign to return streets from cars to people in Columbia's largest city is now a model for the world.  
<http://www.theglobeandmail.com/servlet/story/RTGAM.20070622.whappyurbanmain0623/BNSStory/lifeMain/home> (29/06/07)

Njoroge, F (2002), Poverty and development.  
[http://tuz.tearfund.org/webdocs/Tilz/Roots/english/Advocacy%20toolkit/ATENGA\\_1\\_Poverty%20and%20dvp.pdf](http://tuz.tearfund.org/webdocs/Tilz/Roots/english/Advocacy%20toolkit/ATENGA_1_Poverty%20and%20dvp.pdf)

Piennar, P. Krynauw, M and Perold, R (2005). Public transport: Lessons to be learnt from Curitiba and Bogota  
[www.up.ac.za/academic/civil/satc/2005/2A/Sess%202A%2010%20Perold.pdf](http://www.up.ac.za/academic/civil/satc/2005/2A/Sess%202A%2010%20Perold.pdf)  
(19/06/07)

Rabinovitch, J and Hoehn, J (1995) A Sustainable Urban Transportation System: The "Surface Metro" in Curitiba, Brazil Working Paper No. 19  
<http://www.wisc.edu/epat/.energy/.metro/.entire.html> (20/03/07)

Reyes, S.V.P (2004). Social capital and household income in urban Colombia. University De Los Andes. Department of Economics, Bogotá Colombia.  
<http://www.unisi.it/criss/download/meeting2004/papers/polania.pdf> (11/09/07)

Thale, T (2005). New taxi and bus routes to link north and south  
[http://www.joburg.org.za/2005/mar/mar10\\_transport.stm](http://www.joburg.org.za/2005/mar/mar10_transport.stm) (12/06/07)

The New York Times (1995) June 10  
<http://query.nytimes.com/gst/fullpage.html?res+990CE2DA103DF933A25755C0A9639>  
(060208)

Transportation Department (2007). Mayoral Lekgotla  
[http://www.joburg-archive.co.za/2007/pdfs/sector\\_plans/transport.pdf](http://www.joburg-archive.co.za/2007/pdfs/sector_plans/transport.pdf) (25/06/07)

Transport in Bogota: before and after Transmilenio  
[http://www.transmilenio.gov.co/transmilenio/eng\\_whatis.htm](http://www.transmilenio.gov.co/transmilenio/eng_whatis.htm) (16/06/07)

Transport in Johannesburg, 2007  
[http://www.southafrica.info/plan\\_trip/travel\\_tips/getting\\_around/joburg.htm](http://www.southafrica.info/plan_trip/travel_tips/getting_around/joburg.htm)  
(21/06/07)

Transport Innovator (2006) November-December Volume 2, No 6  
<http://www.gobrt.org/TransportInnovatorNovDec2006.pdf> (10/06/07)

United Nations Development Programme (UNDP/GEF) (2007) Sustainable public transport and sport: a 2010 opportunity PIMS 3276, Project ID: 00055675. Department of Transport Republic of South Africa.

[http://www.thegef.org/uploadedFiles/Documents/Council\\_Documents\\_\(PDF\\_DOC\)/GEF\\_31/PIMS%203276%20South%20Africa%20Transport%202010%20Full%20Proj%20Document%2023Apr07.pdf](http://www.thegef.org/uploadedFiles/Documents/Council_Documents_(PDF_DOC)/GEF_31/PIMS%203276%20South%20Africa%20Transport%202010%20Full%20Proj%20Document%2023Apr07.pdf) (25/06/07)

<http://www.bogota-dc.com/trans/bog-tra.htm> (22/06/07)

<http://www.joburg.org.za/services/metrobus1.stm> (15/09/2006)

<http://www.apta.com/services/intnatl/intfocus/bogota.cfm> (01/06/07)

<http://www.environment.gov.za/soer/reports/Mogale%202003/background.pdf>  
(11/09/07)

<http://www.emfuleni.gov.za> (11/09/07)

<http://gklingala.blogspot.com/2006/11whos-responsibility-is-social.html> (060208)

[www.uctc.net/access/27/Acess%202720-%2005%20-%20Progressive%20Transport%20and%20the poor.pdf](http://www.uctc.net/access/27/Acess%202720-%2005%20-%20Progressive%20Transport%20and%20the poor.pdf) (060208)

<http://www.ptua.org.au/myths/subsidy.shtml> (060208)