TRANSPORT PERFORMANCE INDICATORS: BENCHMARKING TSHWANE AGAINST WORLD CITIES

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ABSTRACT

Since South Africa's return to legitimacy in 1994, much attention has been focused on the need to make the country a global player. The various international sporting events which South Africa has successfully hosted, such as the Rugby and Cricket World Cups, provide an indication of our standing in the world.

As the 2010 Football World Cup (2010 FWC) approaches, it is appropriate to question whether our transport systems will be up to the logistic task of moving the hundreds of thousands of visitors expected in South Africa. It will not merely be a case of logistics, but of movement in comfort, safety, security and on time.

Recently, many Integrated Development Plans (IDPs) have outlined visions which express aspirations of becoming sustainable world cities. This paper sets out to measure the transport performance of one South African city, the Tshwane Metropolitan Municipality (TMM), against a number of world cities, to provide an indication of the its status and some of the transport improvements required by 2010.

The sources of information for the analysis are the global Millennium Cities Database, World Cities Research by the Commission for Integrated Transport and Tshwane research on key performance indicators (KPI) of the transport system. These information sources enable a comparison to be made between Tshwane and world cities such as London, Barcelona, Paris, New York and Singapore. The comparison of key indicators of the characteristics and quality of the transport systems, enable an assessment to be made of the state of readiness of Tshwane transport for the 2010 FWC.

The indicators used in the comparison are motorised travel, demographic changes affecting the distribution and accessibility of the population, land use, economic development and transport cost recovery, infrastructure and traffic. Also considered are public transport use and car ownership.

It is concluded that the major gaps to be closed before 2010 relate largely to operations and management rather than to infrastructure. Included amongst operations are rolling stock, fleet deployment and scheduling, and passenger security, information and ticketing services. It is unlikely that all the existing deficiencies and problems will be resolved by 2010, but given an effective operational plan and commitment to traffic management and law enforcement, the Tshwane metropolitan municipality will be able to satisfy 2010 FWC logistic demands.

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1. INTRODUCTION

In recognition of the SATC theme of “transport challenges for 2010”, this paper poses the question “how will urban transport shape up to the logistic demands of hundreds of thousands of international visitors and local spectators?” The question is not only about getting spectators to matches. Of greater significance will be how foreign visitors experience moving around our cities both as spectators and as tourists wishing to visit attractions such as hotels, restaurants, shopping centres, museums, parks, reserves and entertainment centres.

Visitors will judge their trip to South Africa for the 2010 Football World Cup (2010 FWC) against their own experiences both home and abroad. This is why it is relevant to compare South African urban transport conditions with those in world cities. This is the objective of the paper, which uses Tshwane for comparison with world cities. This objective is also relevant in the broader context of the visions of many Integrated Development Plans (IDP) or strategies in South Africa, which show that cities aspire to become ***‘world-class’ cities*** (Johannesburg IDP, 2003/04) or ***‘the leading international African capital city of excellence***’ (Tshwane City Strategy, September 2004).

The “State of the Cities Report 2004” prepared by the S A Cities Network (SACN) highlights the fact that South African cities face numerous serious challenges in respect of governance, population migration, productivity, social inclusion and sustainability (SACN, 2004). Despite 10 years of change and transformation, the reality is that in many respects, RSA cities are well short of world-city status.

In its generally comprehensive Statistical Almanac, the SACN report contains little information on the state of transport in the cities. This reflects the weak performance of the transport sector, adding yet another challenge to those identified in the report. In view of the significance of transport to productivity, sustainability and inclusivity, failure to identify explicit transport challenges is a serious omission.

2. LESSONS FROM ABROAD

Prior to the Sydney Olympic Games in 2000, a report was released on a strategy for Sydney 2020 (The Committee for Sydney, October 1998). It is of interest to note that in describing Sydney’s position, the report noted that *“existing research suggests that Sydney is Australia’s ‘world city’. The central issue …. is how to advance its position … in a global and increasingly competitive environment”.* A framework was suggested to guide the 2020 strategy. The framework highlights the importance of transport in the development and sustainability of world city status. In view of the transport gaps in the SACN analytical framework, which generally has a short-term focus, the Sydney model can also be used as an analytical framework in South Africa, because of its longer-term orientation.

Figure 1 shows the development issues used to benchmark Sydney against global cities in the Sydney 2020 project. It is of interest to note how strongly transport, mobility or accessibility features in the list of issues highlighted in the diagram (e.g. transport choices, mobility, car dependence, sprawl, friction of space, etc).

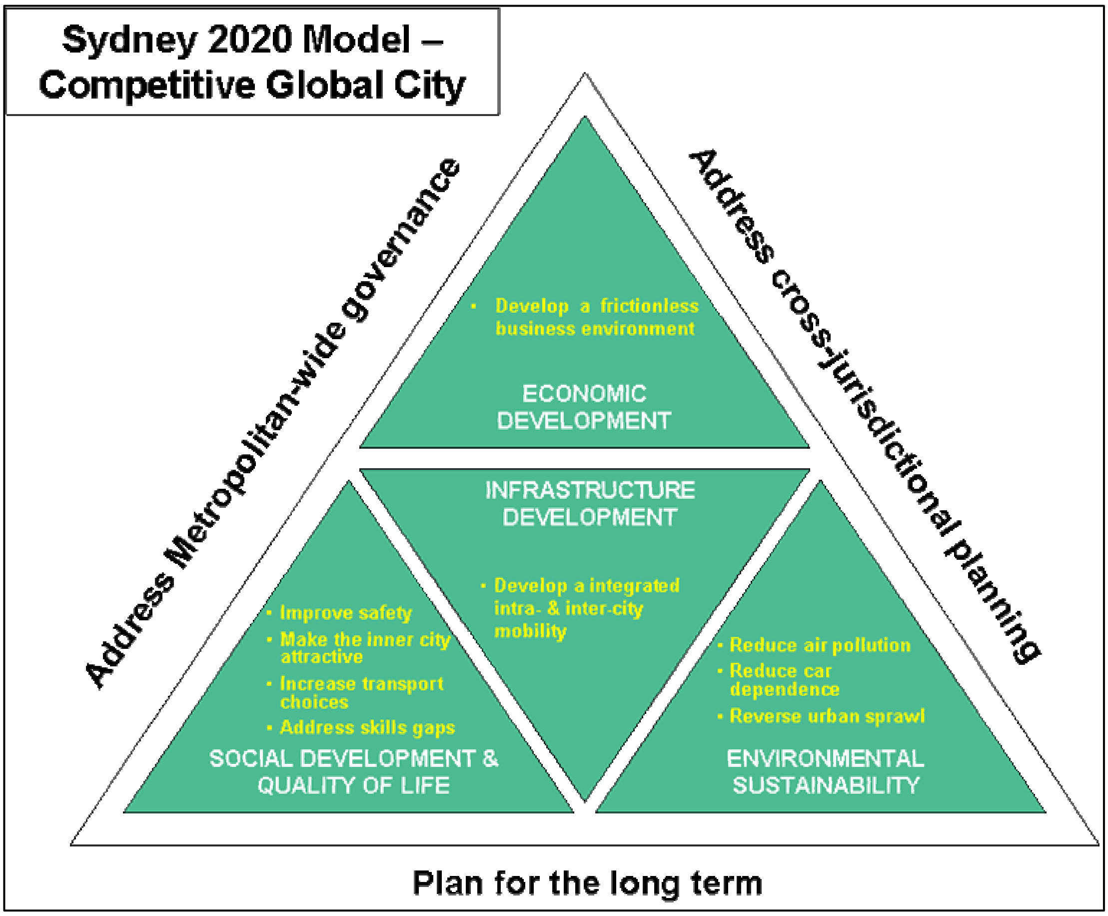

Figure 1: Development issues in global cities

The Sydney framework highlights similar drivers or targets for the development of a competitive global city to the challenges suggested by the SACN analytical framework. The significance of the transport system is, however, much more apparent in this model. It clearly highlights the crucial role of transport in shaping city development, environmental sustainability and quality of life.

(i) Public transport affects the **quality of life**. The model suggests the need to increase transport choices, whereas we in South Africa are talking about optimum mode and phasing out parallel subsidy. The inference is that we should “force” passengers into the optimum mode. Increases in choice must facilitate non-motorised transport (NMT) (Quality of Life).

(ii) **Infrastructure development**, whether it is roads, rail or public transport facilities must ensure intra- and inter-city mobility. At present, for example, in Gauteng inter-city mobility is being heavily compromised by congestion between Johannesburg and Pretoria and inadequate public transport (Infrastructure Development).

(iii) Sprawl and the location of the poor at the periphery of the cities, often beyond the ‘urban edge’ have created serious time and space frictions in the Gauteng City Region. This friction hampers **economic development** through time penalties and loss of opportunities for business activity. What could be productive capital is expended in unproductive travel and the burning of fuel and energy, for transport rather than industry (Economic Development).

(iv) With reference to **environmental sustainability**, increasing car dependence and deteriorating public transport services are resulting in a negative spiral which accelerates both these significant trends. Rising car dependence is contributing to ongoing sprawl and the elimination of agricultural land in Tshwane environs (Environmental sustainability).

The foregoing indicates that the Sydney 2020 model can be most useful in identifying leverage points and strategic interventions necessary to build a competitive global city. This model is less about system management (SACN framework) and more about longer-term restructuring of the city, and investment in a better public transport system. An attractive and efficient public transport system operating at the core of the city will help to contain sprawl and even attract fringe informal settlement inhabitants into the centre. Improving inner-city public transport was a cornerstone of the Sydney Olympic and 2020 strategies and should be at the centre of the 2010 FWC strategy.

Figure 2 indicates how the framework was used to assess the performance of Sydney and the benchmark cities, indicating the areas needing to be targeted to improve world city status. A judgment has been made, and added to the figure below, about the status of Tshwane, relative to other world cities, based on the recent study on KPIs (TMM, February 2005).

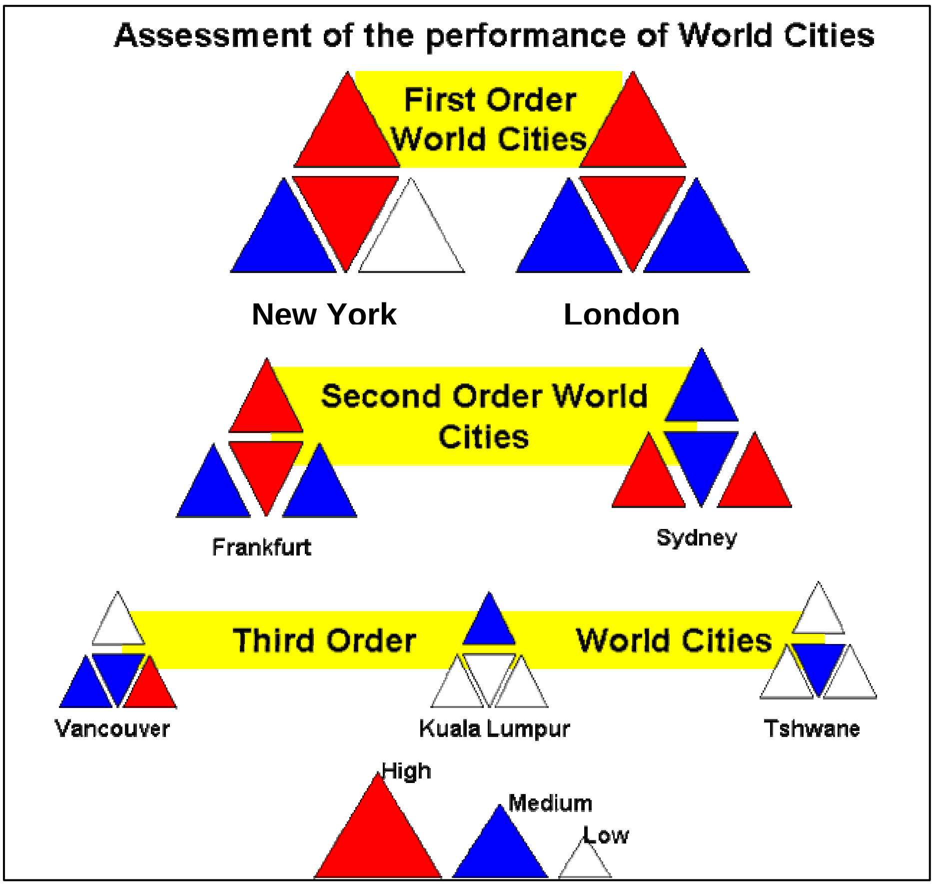

Figure 2: Assessment of the performance of cities (after Sydney 2020)

In the figure size of triangle indicates the world status of each city and colour is used to indicate high, medium and low performance by the different cities. For example, New York is rated only medium on quality of life on account of crime and other social ills and a low on environmental sustainability on account of congestion and pollution caused by car use and urban sprawl,. Likewise London is only rated medium in terms of these assessment criteria. Tshwane can only score medium on infrastructure, and low on the other criteria, indicating the extent of development that is still required to achieve world- city status in terms of economic development, quality of life and sustainability. Transport improvements can contribute significantly to all three of these indicators.

Further reference will be made to the Sydney and S A Cities Network frameworks, after the assessment of the performance of the transport (and land use) system in Tshwane.

3. SOURCES OF INFORMATION USED TO ASSESS THE PERFORMANCE OF TRANSPORT IN TSHWANE

Apart from Sydney 2020, the main sources of information for the analysis undertaken in this paper are the following:

(i) UITP. Millennium Cities Database: Analyses and Recommendations, Jean Vivier, Head of Programmes and Studies UITP, May 2001.
(ii) Commission for Integrated Transport. World Cities Research, Prepared by MVA in association with Dr Jeff Kenworthy, Murdoch University Australia, March 2005.
(iii) City of Tshwane Metropolitan Municipality. The Measurement of Key Performance Indicators of the transport system in the City of Tshwane, (TRC Africa), Pretoria, February 2005.

Information obtained from different sources is not always directly comparable because of differences of definition, for example, the area of a city may be based on political, functional, postal or other such boundaries which vary from place to place. Every effort has, however, been made to ensure that the data used for this analysis are comparable.

4. TRANSPORT INDICATORS IN WORLD CITIES

Tshwane is compared with the world cities shown in **Table 1**. In terms of population size, Tshwane does not compare with the others, which are all at a mature stage of development. As a relatively young city, it can expect considerably more growth in the next 50 years. Accordingly, it needs to plan to accommodate such growth in a sustainable way so the lessons of world city growth should be heeded.

Table 1: Population of Tshwane in comparison to world cities (millions)

City	Inner City	Suburbs	Total
Tokyo	8 130	25 283	33 413
New York	8 008	11 219	19 227
Paris	2 125	8 875	11 000
Madrid	2 939	5 205	8 144
London	2 766	4 416	7 182
Barcelona	1 496	2 885	4 381
Tshwane	282	1 675	1 957

Only the Gauteng city region as a whole, comprising Ekurhuleni, Johannesburg and Tshwane begins to approach the population size of the metropolitan world cities in the table.

4.1 Motorised travel

Throughout the world, motorised travel has grown rapidly since the 1960's, mainly due to the increase in the number of cars, which has caused a slight decline in public transport use. The trends in car and public transport use are depicted in **Figures 3 and 4** respectively, which show rising car use in most cities. Only in New York has there been a slight decline in car use since 1991, associated with falling car ownership. In contrast to car use, public transport use has declined in Europe, except in London which experienced growth in the 1980's and is again experiencing growth at present on account of congestion pricing policies in central London.

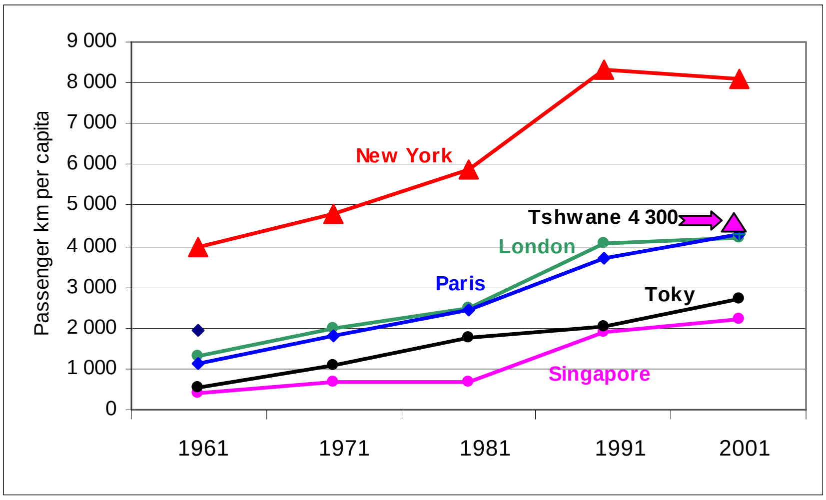

Figure 3: Growth in car use in world cities

Public transport use in Asian cities has risen since 1980, particularly in Singapore which introduced a central area licensing scheme in 1983. The growth in both car and public transport use in Singapore is indicative of rising population, and growing per capita GDP, with resultant increases in trip rates.

The position of Tshwane in 2001 is indicated in the figures. Not too much should be read into the results (averages) which reflect the extremes of high car ownership and use by White households (a quarter of the population) and the captivity of most Black households to public transport.

Figure 4 shows that the per capita travel by public transport in Tshwane is relatively high, despite the fact that most public transport travel is based on work trips. The reason is the good public transport share of the travel market (47% of motorised trips).

Unfortunately, this result does not add up to good mobility by public transport, on account of the relative poverty of the population and the limited destination choices offered by public transport services.

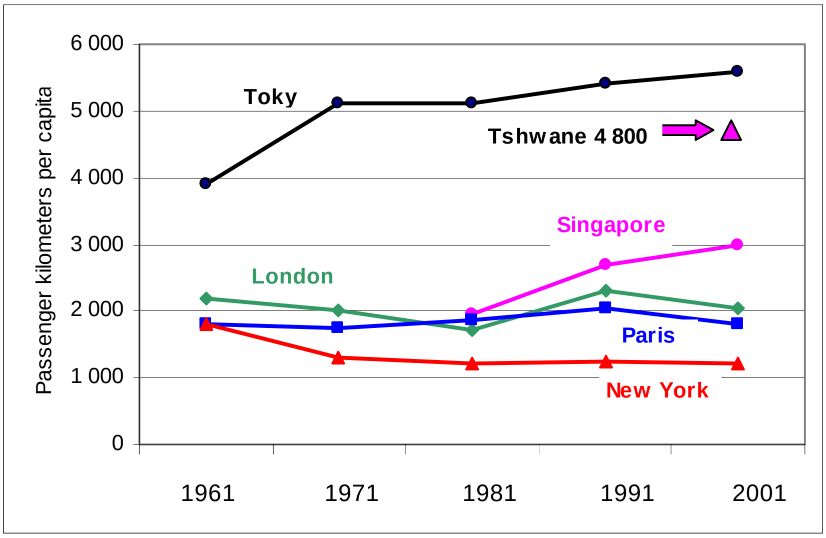

Figure 4: Trends in public transport use in world cities

Public transport passenger kilometres of travel are high in Tshwane because of the long distances traveled by commuters from the perimeter to the centre on account of apartheid and the low densities of development in the city. It has not been possible to show trends in Tshwane on account of the constant boundary changes which have taken place over the past 20 years. Judging by recent Stats SA surveys, however, and comparisons between Tshwane and Pretoria information, it seems that car ownership and use is increasing, while public transport use is declining.

The key drivers of demand for car travel and public transport in cities, each of which will be discussed separately, are the following:

(i) demographics;
(ii) land use patterns;
(iii) economic growth;
(iv) public transport;
(v) public transport fares and cost recovery;
(vi) highways and road,; and
(vii) car ownership.

4.2 Demographics

Rapid urbanisation in European and North American cities took place during the late 19th century, before the advent of the private car. Initially, population concentrated at or near the centre, but rail development resulted in decentralisation even before the rapid rise in car development. Population dynamics differed from city to city as growth occurred. For example, in Paris the wealthy remained near the centre while the poor moved to peripheral areas with little transport provision. In London, the middle class moved out of the centre, facilitated by rail development.

Post Second World War, growth in car manufacture and use saw all these world cities expanding rapidly, with lower density development occurring in suburban locations. European and American cities were initially mono-centric, with multifunctional centres (World Cities Research, March 2005). On the other hand, Tokyo's radial rail system and poor housing at the centre, encouraged people to move to remote suburbs. Currently three-quarters of commuters travel more than an hour to work, even though Tokyo has become very multi-centric.

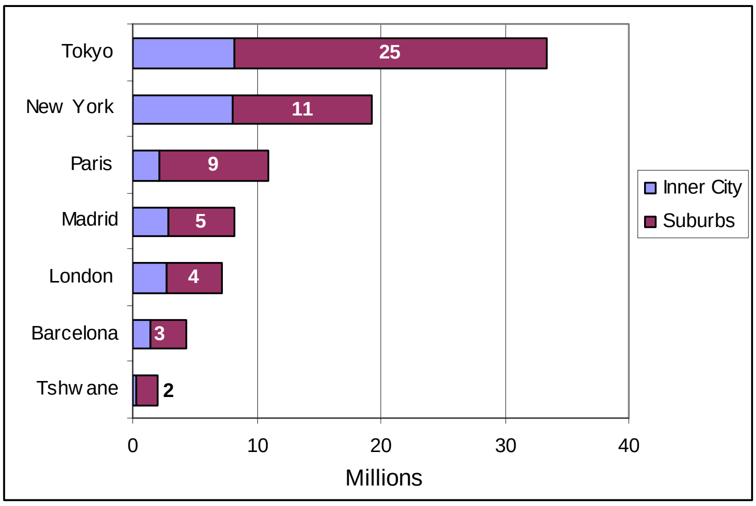

Figure 5: Absolute size and structure of the population In metropolitan world cities

Figure 5 shows the size of the cities chosen for analysis. The importance of the inner city is evident, home to a quarter to a third of the population in most of the cities. This is not apparent in Tshwane, where less than 10 per cent of people live in the inner city. This is unfortunate because of the accessibility of the centre: inhabitants can access activities by means of non-motorised transport.

Most world cities have experienced rapid decentralization since about 1970. The World Cities Research (WCR) reported that the "Ville de Paris population fell by 11 per cent (275 000) between 1979 and 2000 while the surrounding Ile de France grew by 30 per cent (2 million)". This is shown in **Figure 6**. The exodus of people and jobs tempered policies to restrain car use as much of the traffic in the centre is generated by residents and few commuters and visitors enter the centre by car.

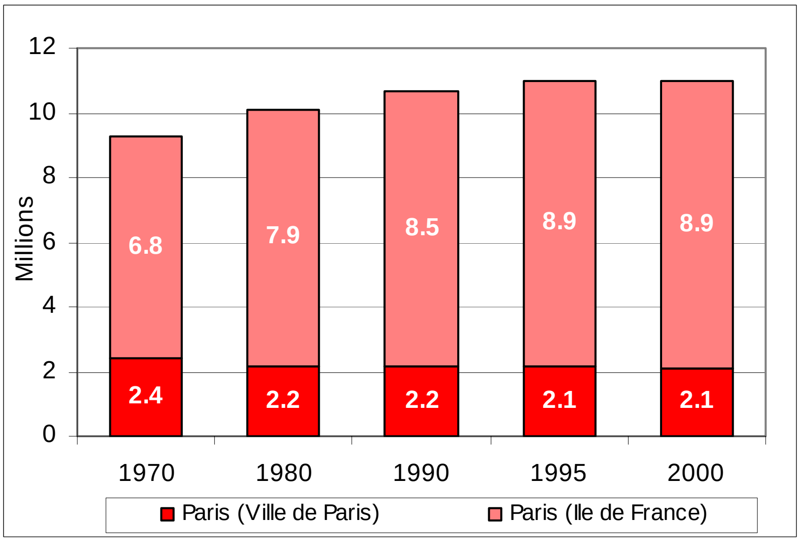

Figure 6: Changes in the metropolitan population (e.g. Paris)

In Tshwane, since about 1980, there has been a loss of jobs in the centre which accelerated after the move of provincial government to Johannesburg. The resident population has, however, grown since 1994. Despite this, there is a need for further growth and densi-fication in the centre, to take advantage of the good accessibility to opportunities, activities and infrastructure.

Table 2 shows the age structure of the population in world cities, highlighting one of the challenges being faced by Tshwane. Relatively speaking, its dependent population is large (children and over 65 years) placing a burden on the working age population. Comparison of Tokyo and Tshwane indicates the larger relative pressure on the salaries of Tshwane workers to provide for food, clothing, shelter, education and the health of their dependants.

Table 2: Age structure of the population in metropolitan world cities

City	Child	Young Adult	Mid Adult	Older Adult	Over 65
	Percentage of the population				
Barcelona	11.6	11.4	23.8	31.7	21.5
London	18.9	13.9	38.0	17.8	11.0
Madrid	17.3	63.4			19.3
Moscow	18.8	57.8			23.4
New York	26.0	62.0			13.0
Paris	18.3	36.0		26.1	19.6
Singapore	21.5	13.0	36.6	21.6	7.2
Tokyo	11.9	70.9			17.1
Tshwane	33.1	46.6			17.1

The burden on the working age population in Tshwane is further exemplified by reference to **Figure 7** which contrasts the average size of households in the city with those in world cities.

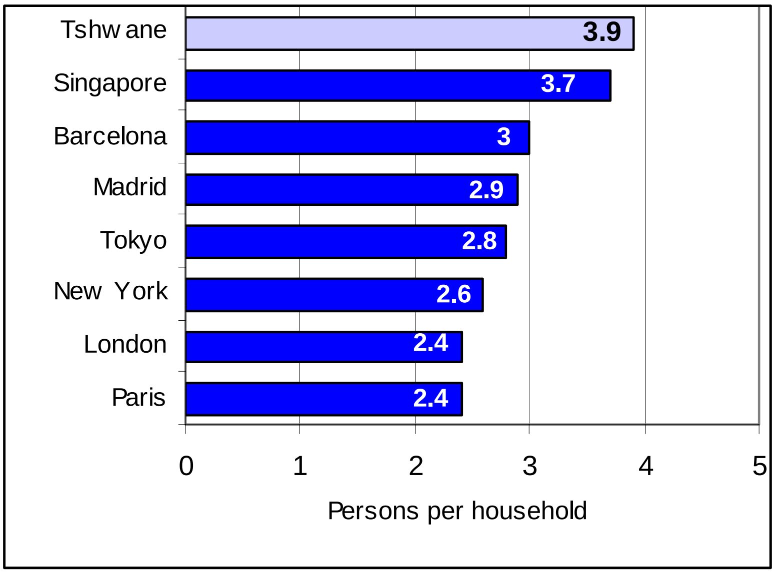

Figure 7: Average household size in metropolitan world cities

In most world cities, the average household size has decreased while the average age of household members has increased. According to the U.K National Travel Survey, the age cohorts with the highest propensity to drive are those in their 30's and 40's. WCR reports, however, that the aging population in world cities suggests that the demand for car use should fall in the future.

Planners in Tshwane and the RSA need to be aware of these trends and the possible impact of our own demographic time-bomb (HIV and /AIDS) on the demand for travel.

4.3 Land use pattern

The physical development of cities and the resultant land use pattern influences mode choice and the need to travel. **Figure 8** shows the employment in central areas in world cities. Kenworthy and Laubé (1999) found that residents and employees in 'compact cities' travel less, make fewer car trips and more on foot, than those in lower density cities.

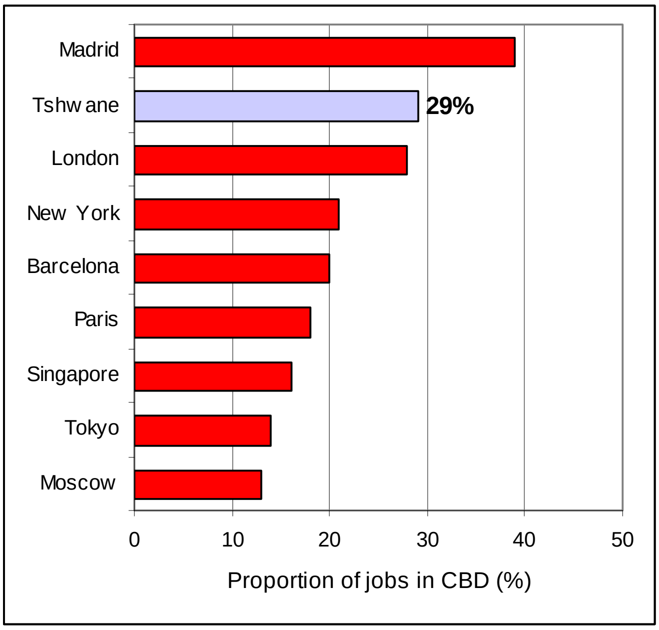

Figure 8: Employment in central areas

In New York, zoning has ensured that most residential areas have pockets of employment and retail activity. As in Paris, this has taken the development pressure off the city centre. Sprawl and dispersed travel patterns cannot, however, be served by public transport. Although New York has a high level of car dependency, it has the lowest car use of all U S cities, due to its extensive high density inner area and large rail oriented public transport system.

Because most urban growth in S.A cities occurred in the motor car era, they have become sprawling low-density settlements. Mono-functional zoning has resulted in city centres with exclusive business use and little residential land use. This explains the relatively large proportion of employment activity in the CBD in Tshwane. In the last two decades, however, there has been considerable employment decentralisation in the city.

Table 3 shows some comparative land use indicators in various world cities. One of the problems of this type of comparative analysis is that the definition of terminology (e.g. inner city, city centre or CBD) is not always consistent. Nevertheless, the table offers some interesting insights into aspects or urban development which impact on transport in general and public transport in particular. New York, Tokyo and Paris have large urban areas, even larger than Tshwane which is considered to be the classic case of a sprawling city as a result of apartheid settlement policies. Of the three, New York has the lowest overall population density, but the highest density in the inner city area. London, on the other hand, has a much higher overall density but a relatively low density in the inner city. These differences are caused by differences in the built form epitomised by the contrast between the Manhatten and City of Westminster skylines.

The density of development in Tshwane, both in the inner city and in the city as a whole, is considerably lower than that of world cities. The low density of development makes it difficult for a viable public transport system to be developed.

Table 3: Comparative land use indicators in metropolitan world cities

Land Use Indicators	Barcelona	London	Madrid	Moscow	New York	Paris	Singapore	Tokyo	Tshwane
Area									
Metropolitan area (km²) [1]	3 235	1 579 (Inner London	8 028	1 091	22 763 (NY City 785)	12 012 (Ville de Paris	648	125 663	**2 203**
Urbanised area (km²) [2]	141	1 186	604	588	10 657	2 311	319	3 689	**1 509**
Inner city or CBD (km²)	n/a	27	42	19	23	23	8	42	**19 (53)**
Population Density									
Metropolitan area (pop/km²)	8 387	4 438	645	7 974	845	916	4 612	2 386	**889**
Urbanised area (pop/km²)	19 710	5 907	8 585	14 626	1 804	4 762	9 353	8 768	**1 276**
City centre (pop/(km²)	16 601	6 296	22377[3]	15470*	22 970	18 227	7 500	6 334	**2 342**

Note: [1]The metropolitan area depends on arbitrary administrative boundaries. In some cases this is very large and incorporates lots of non-urban land (such as Madrid, Paris and New York), whereas in some cases it is very tight around the urban area (such as London). [2] The urbanised area is a better measure of the built-up area, i.e. the metropolitan area without agricultrual land, forest, large parks and bodies of water. [3] Refers to the city rather than the CBD. * 1980 data. Source: Kenworthy and Laube, 2001, plus www.economist.com and consultant's own research. Tshwane figures for urbanised areas exclude Rooiwal, Pretoria Farms and the rural south west.

Singapore is an interesting case on account of the planning interventions which have shaped the city state. The development of Singapore was planned by the Urban Re-development Agency and regulated by Government controls on land sales. New towns and suburban areas have high densities and a mix of functions to reduce the need to travel. Development is well integrated with transport provision; the public housing areas are well served by the extensive public bus and rail networks, though there is higher car dependency in the private estates (WCR, March 2005).

Singapore's revised 1991 Concept Plan was strongly influenced by transport considerations, and contained two key land use planning strategies: to decentralise activities to balance rail utilisation and to reduce the need to travel by locating employment opportunities close to residential areas.

The impact of land use patterns on travel is illustrated in **Figure 9**. The total motorised passenger kilometres travelled is influenced by three main factors as follows:

- the overall size and population density of the urban area;
- the income and car ownership levels of the population; and
- the proximity between homes and trip generating activities.

In the case of Tshwane roughly half of the motorised travel is by private car and the balance by public transport. The latter is high because of the long distances over which public transport users travel to get from the periphery to the centre of the city. It is evident from **Figure 9** that there is a good correlation between motorised travel and the size of the city. (Note that the R^2 figure is from the WCR report, but is unlikely to be drastically affected by the insertion of Tshwane which lies close to the trend line.)

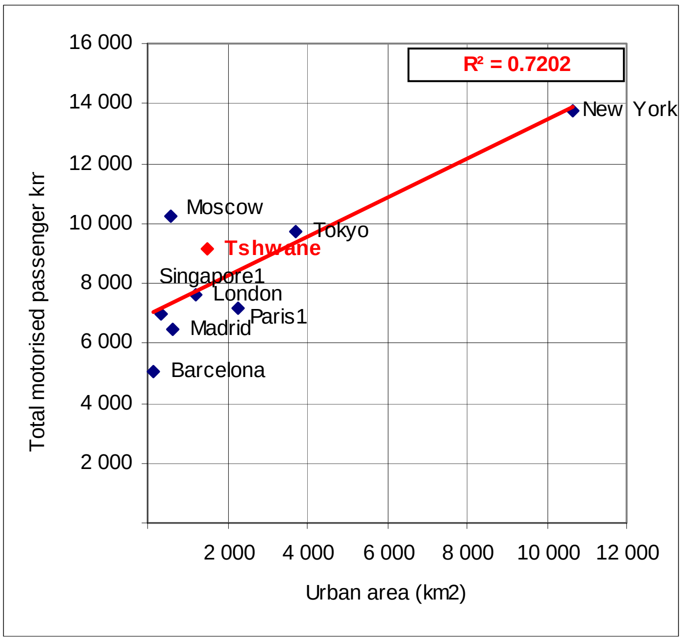

Figure 9: Size of urbanised area and motorized travel (cars and public transport) in metropolitan world cities

Figure 10 shows the motorised travel divided between public and private modes of travel. The influence of land use is evident in that the largest cities by area are also those with the most motorised travel (New York, Moscow and Tokyo). At the other end of the scale, the two Spanish cities have amongst the smallest urbanised areas, explaining their lower motorised travel.

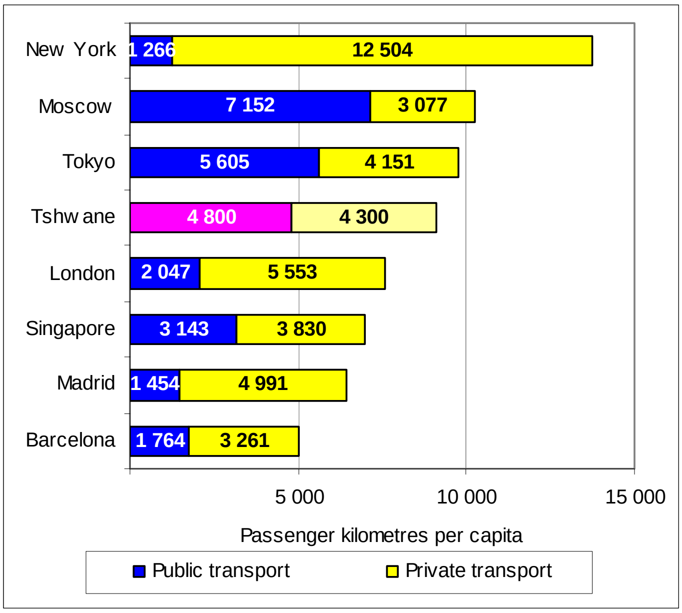

Figure 10: Motorised travel by mode in metropolitan world cities

Tshwane is one of the few cities which has more passenger kilometres travelled by public rather than private transport.

The average trip length in relation to the size of the urbanised area is shown in **Figure 11**. A typical journey in the 'spread out' cities of New York and Tokyo is significantly longer than in smaller cities such as Barcelona and Singapore.

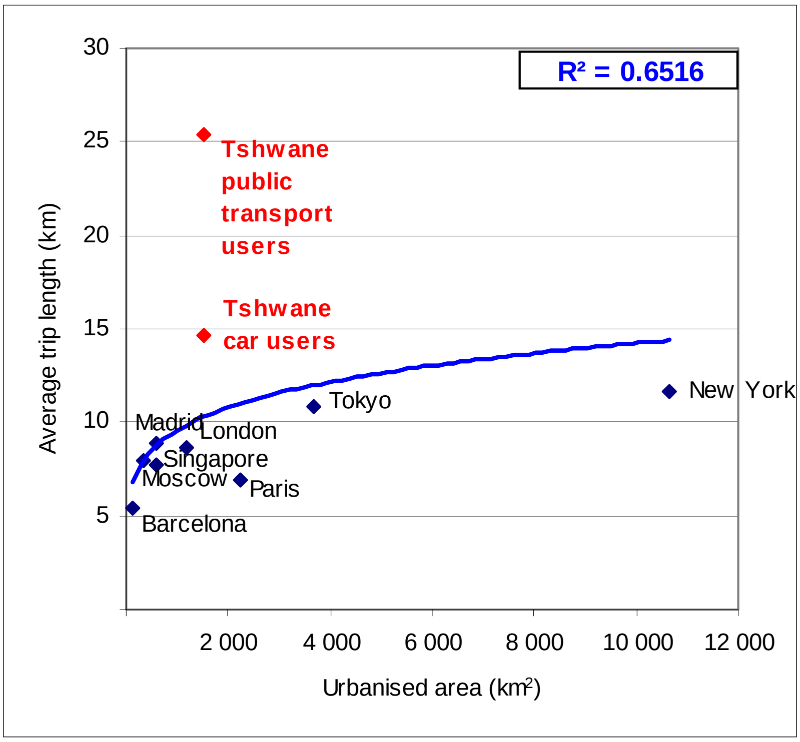

Figure 11: Urbanised area and average trip length in metropolitan world cities

Trip lengths by car in Tshwane are higher than the average trips lengths in other world cities on account of the low density of development in the city. The long trip lengths for public transport are caused by most public transport users (captives) residing on the periphery of the city. Amongst the global cities there is a fairly good correlation between trip length and the size of the urban area (R^2 = 0.65) but when Tshwane is added the R^2 drops considerably

The relationship between trip length and the density of an urban area is highlighted in **Figure 12.** The R^2 improves when the Tshwane results are added to the other cities. Cities that have retained high densities in the city centre and focused additional growth in mixed use suburban centres tend to have shorter average journey lengths. Hence the lowest levels of motorised travel are in compact, high density cities.

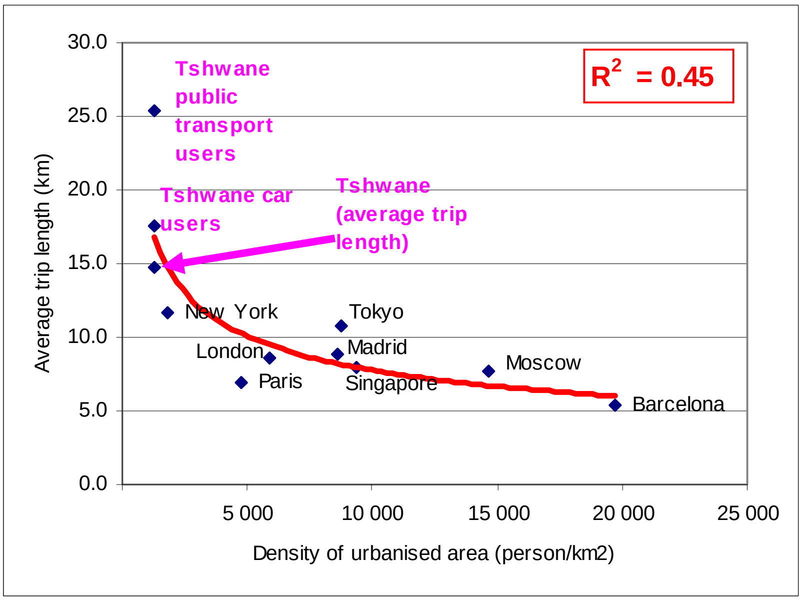

Figure 12: Density and average trip length in metropolitan world cities

<u>4.4 Economic growth</u>

Figure 13 shows car travel in relation to GDP in metropolitan world cities and in Tshwane. There is no apparent link between wealth and total motorised mobility or total travel by car.

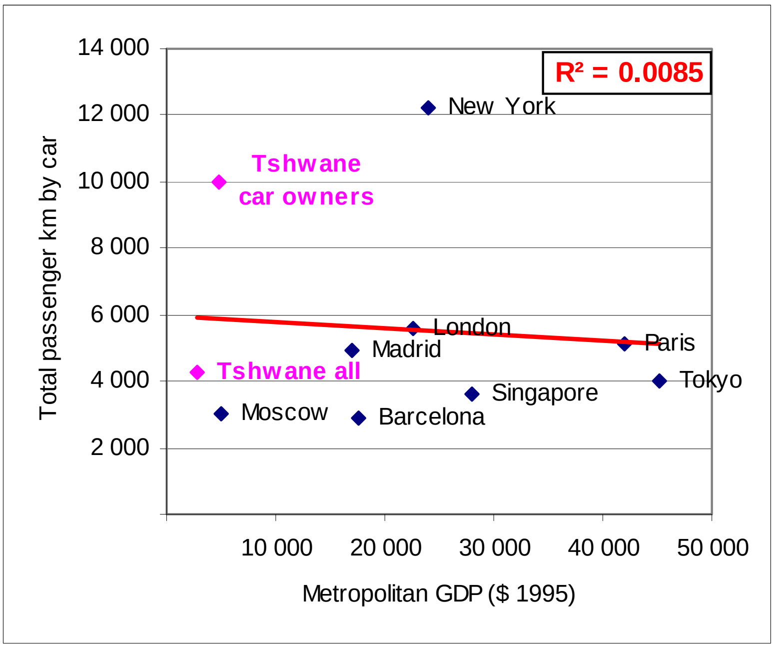

Figure 13: Car travel in relation to GDP

The effects of transport policies, congestion and other contextual factors have helped to decouple these factors. One of the reasons for the absence of a correlation between wealth and the quantum of travel in urban areas is that in some cities (e.g. London) wealthy commuters live outside the city boundaries.

The duality of the Tshwane population is revealed by the difference between car owners and the population as a whole.

4.5 Highways and roads

The relationship between roads and population is illustrated in **Figure 14**. In this instance, the larger metropolitan areas (by population and area), are also those with the greatest lengths of road per capita. Two aspects of the figure are of interest with respect to Tshwane, namely the high per capita road provision and the relatively large proportion of the road length which is motorway standard. These phenomena are caused by the relatively large size and low population of the city, resulting in longer roads lengths on account of the low density of settlement.

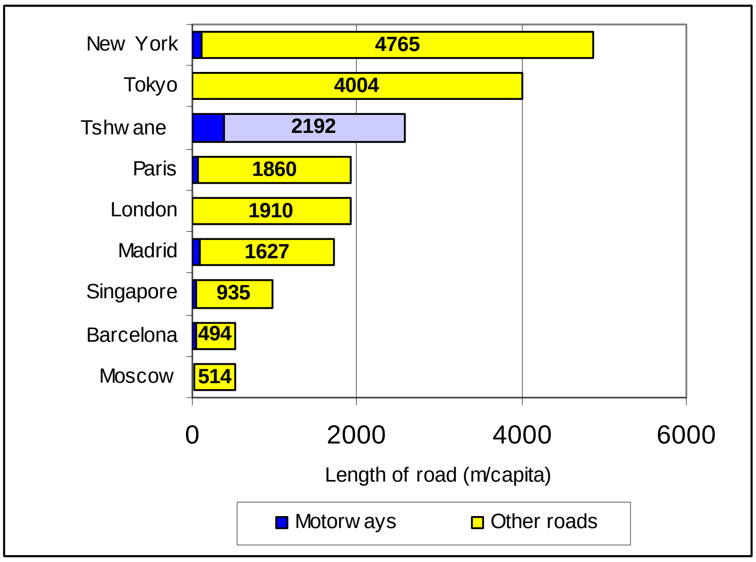

Figure 134: Roads per 1 000 persons in metropolitan world cities

The foregoing is further exemplified by reference to **Figure 15** which shows the length of roads per urban hectare in the selected metropolitan world cities and Tshwane. In this instance, because of the low density of development in Tshwane, road length per hectare is much lower than is the case in the selected global cities.

Of interest in **Figure 15** is the extent of road development in Tokyo. In the mid-20th century rapid growth saw Tokyo outgrow its network of minor roads. An outer ring road was built and inside this, expressways feeding inner and central ring roads were superimposed on the existing urban structure. In contrast, in London, most radial routes are single carriageway facilities, which also provide access to fronting properties.

In most of the world cities, converging radial routes have resulted in problems of through traffic and distribution, which have been addressed in various ways, from investment in new infrastructure to severe car-restraint measures, such as have now been introduced in London. New York is unique in that its strategic road links form a grid pattern. Access to Manhatten is provided by bridges and tunnels which provide a cap on traffic entering the centre and tolls are used to manage the level of demand throughout the day.

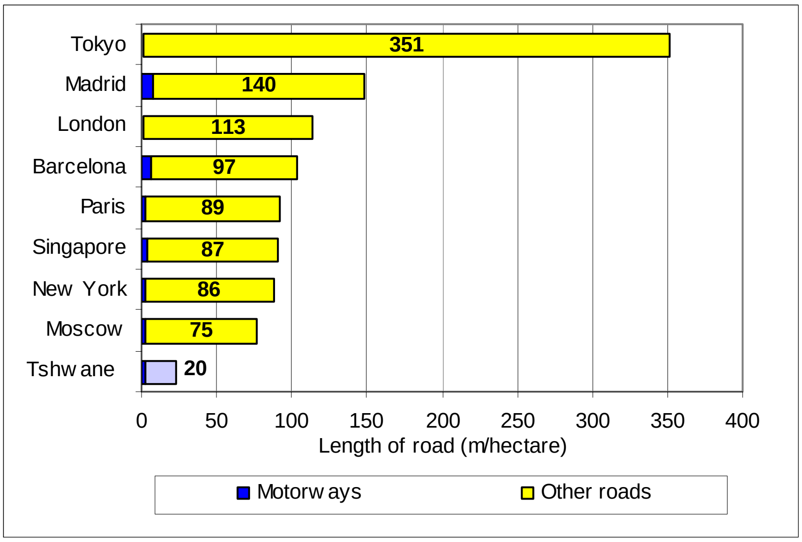

Figure 15: Roads per urban hectare in metropolitan world cities

The intensity of traffic in Tshwane and the selected world cities is shown in **Figure 16**. This measure is an indication of the extent of congestion on roads in the metropolitan areas as a whole. Within the cities, the differences in the capacity of the road links help to explain average speeds (**Figure 17**) and congestion levels. In New York and Paris, the planned multi-lane roads accommodate higher traffic volumes and have higher speeds than the single carriageway roads in London and Tokyo that evolved as these cities grew. Significantly, only in Tokyo does the average speed of public transport exceed that of general road traffic.

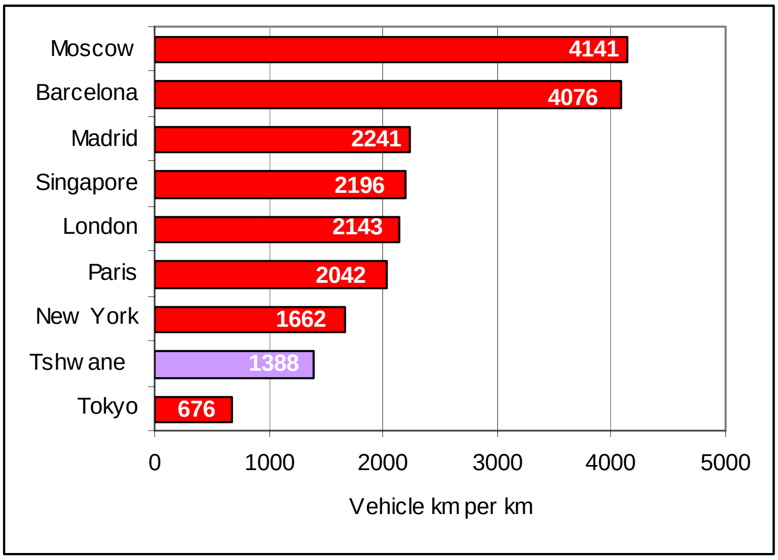

Figure 14: Traffic intensity in metropolitan world cities

Low road provision and road pricing are evident in the high traffic intensity yet above average speed in Singapore. The road charges discourage driving in congested conditions, helping to manage traffic levels throughout the day. Parking policies are used to influence traffic demand in all cities except Moscow and Tokyo where parking spaces are limited.

Tshwane has a relatively low intensity of traffic and a high average speed, indicating minimal congestion even during peak periods. In the inner city the average peak period speeds are much lower averaging about 22 km/h on arterial roads. This compares to 16 km/h in London, 20 km/h in Barcelona and 25 km/h in Singapore. In Tshwane, average traffic speeds on sections of arterial road in some suburban areas (e.g. Lynnwood). are currently lower than in the inner city Suburban peak period average speed in Tshwane is 57 km/h which is much higher than in London (27 km/h) and about the same as in Barcelona (59 km/h).

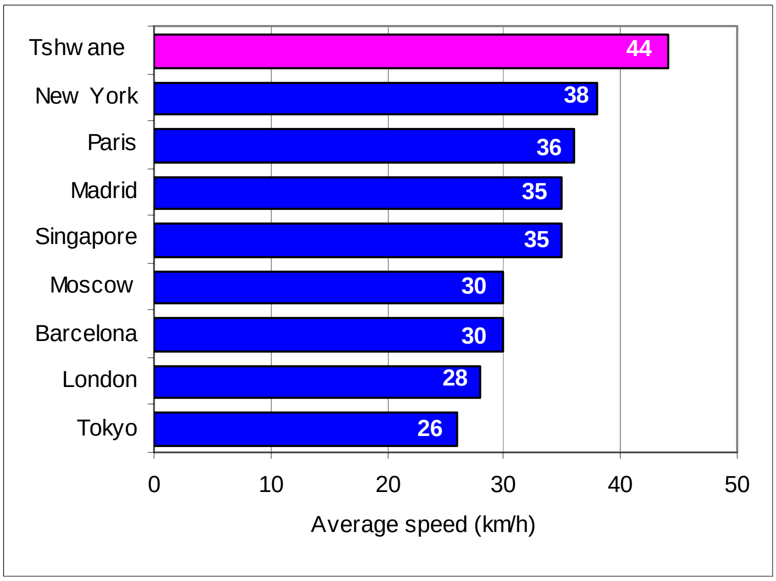

Figure 15: Average traffic speed in metropolitan world cities

Parking policy does not feature as a mechanism for travel demand management in South African cities in general and in Tshwane in particular. The time is coming, however, when restriction of the supply of parking, or more realistic parking charges, will need to be introduced in order to address traffic congestion. **Table 4** indicates parking charges in Tshwane in comparison to those in some world cities. In shopping and business areas, the parking charges are related to redemption of private developers' capital outlay for the cost of structures, rather than to any attempt to use pricing as a demand management mechanism.

Table 4: Comparison of parking charges in metropolitan world cities

Parking Charges	Paris	London	New York	Tshwane
Shopping Area:				
Parking charge (£ per hour)	2	3	2.5	0 - 0.5
Maximum duration of stay (hours)	2	2	1	None
Business Area:				
Parking charge (£ per hour)	2	4	2	0 - 0.6
Maximum duration of stay (hours)	2	1	1	None

Note: Streets selected in the vicinity of Bourse and Grands Magasins, Paris; Oxford Circus and City of London, London; and Fifth Avenue and Wall Street, New York. Prices have been adjusted for purchasing power parity. Source: MVA, 2004.

4.6 Public transport

The significance of the Metro / Underground for traffic movement into central cities in Europe is clearly illustrated in the table. Buses serve certain arterial routes but mainly function as feeders. The significance of minibus-taxis for the line-haul movement into central Tshwane is highlighted in the table.

Most bus movements in Tshwane are provided by contracted operators (PUTCO and the successors of North West Star). These are predominantly peak period services on a large number of routes. The municipal operator provides about a third of the daily bus trips, including some off peak services. Neither the train nor bus off-peak services can be considered adequate for tourists or people visiting the city for the Football World Cup.

Table 5 shows the modal shares of the various transport modes used to access the city centres in Tshwane and two of the selected world cities, namely Paris (Ville de Paris and central London). It should be noted that comparisons between London and Paris are complicated by the different levels at which data are collected. The first four arrondisements in Paris have a population of 101 000 and area of 5 km², compared to Central London which has a population of 170 000 and area of 11km².

Table 5: Modal shares in the city centre in metropolitan world cities

Mode	Paris (Arr 1-4)[1]	Central London[1]	Tshwane Inner City[2]
	Percentage		
Rail / Metro	70	71	14
Bus	4	10	11
Minibus-taxi	-	-	28
Car / Motorcycle	17	12	34
Walk / Cycle	9	6	14

[1]Source: MVA 2004 and TfL 2002. Tshwane has a population of 31 400 and an area of 19km2. [2]Source 1999 GPMC Household Travel Survey.

Table 6 shows the length of the rail systems in Tshwane and selected world cities.

The total length of lines is low in Tshwane relative to the area of the city, and the service is restricted to 4 to 5 main lines which converge radially on the centre from the periphery. On these lines, most passengers embark or disembark fairly close to the edge of the city. Accordingly, it can be said that the commuter rail service generally does not feature as a means of getting around the city.

Table 6: Length of rail system in metropolitan world cities

City	Length of Metro (km)	Metro Share of Bus and Metro Trips (%)	No. Bus Routes
London	415	38	700
New York[1]	368	65	235
Tokyo	292	82[2]	n/a
Moscow[3]	265	67	540
Madrid[4]	226	58	188
Paris[5]	212	88	534
Barcelona[6]	111	63	104
Singapore	83	25	244
Tshwane (Commuter Rail)[7]	148	21	2059

[1]Data for New York City; [2]Data for 23 Wards; [3]Bus includes trolleybus; [4]Bus data for city; [5]Bus data for Ville de Paris; [6]comprises underground sections of the MRT system. [7]Includes Minibus-taxis. Sources: www.wikipedia.com, Jane's Urban Transport Systems 01-02, American Public Transport Association (2005) and individual operators.

The supply and density of rail provision is depicted on **Figure 18.** Barcelona stands out because it is a small area with a high population density. London has the largest supply of lines and second highest density in the sample, even though the population density of Greater London is relatively low. The Paris metro only covers the inner Ville de France area. Stations are closely spaced so speeds are low and the system caters largely for short-distance movements rather similar to the role of buses in Greater London. The older systems in Paris, London and New York are largely radial lines converging on the centre. The newer systems, such as in Tokyo, Barcelona and Madrid provide cross-city links.

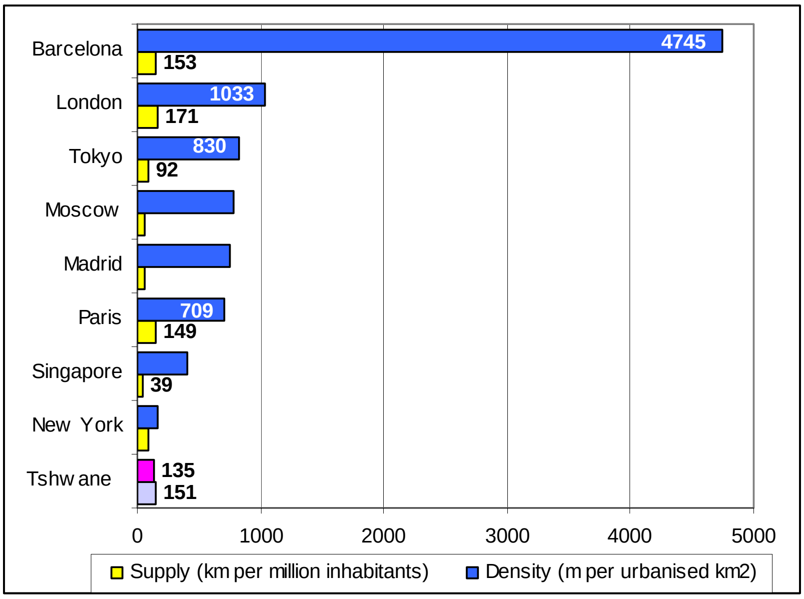

Figure 16: Provision of rail in metropolitan world cities

The supply and density of routes in Tshwane is low on account of the size of the city and the relatively low population. In the inner-city area, the train service does not really function as a inner city train service. The trains are not marketed as such, neither do they serve the destinations desired by the residents of the suburbs through which they pass.

4.7 Car ownership

Car ownership and use is a critical factor affecting the viability of public transport in cities. **Table 7** shows the ownership and availability of cars in the inner parts of selected world cities.

Table 7: Car ownership and availability in metropolitan world cities

Car Ownership	Inner London	Ville de Paris	New York City	Tshwane 1999	Inner Tshwane 1999	Pretoria 1990
No car households	51%	54%	56%	65%	80%	30%
One car households	39%	40%	32%	17%	18%	27%
2+ car households	10%	6%	12%	16%	2%	26%
Cars per 1 000 residents	272	288	255	202	140	315

Source: Transport for London 2004; Office for National Statistics Census 2001; DREIF, Les résultants détaillés de l'enquête globale de transport 2001-2002; US Census 2000.

In the case of Tshwane, the higher density inner city is contrasted with the city as a whole. Also of interest is the position of the metropolitan core, Pretoria, in 1990. The Pretoria area was the epitome of apartheid, in that the majority of its population was White. This group was more affluent as is evident in the fact that only 30 per cent of households in 1990 were not owners of cars. Generally, car ownership in Tshwane, particularly of households in the inner city, is low in comparison to the selected world cities. Car ownership has fluctuated in some of the selected world cities. This is because of controls on car purchase through tax (Singapore) high insurance costs, congestion and the difficulty of finding parking (London and New York).

In Tshwane, car ownership can be expected to grow rapidly as incomes increase. This is because there is little congestion and there are few restrictions on the use of road space. Parking is abundant and if not always free, is relatively cheap by world standards.

4.8 Summary of the state of the transport system in Tshwane

Table 8 shows some of the results of an evaluation of the performance of the transport system in Tshwane according to the specifications for monitoring KPIs in the Draft National Land Transport Strategic Framework (DoT, 2002). The table includes some of the performance indicators which were specified in the White Paper on National Transport Policy (DoT, 1996). Targets which were suggested are used to highlight the status of Tshwane as a whole and those parts of the city which do not achieve the target.

It is apparent from **Table 8** that the city has two very different conditions. At the periphery, most residents use public transport, whereas in the inner city there is a high dependence on private transport. Neither the inner city, nor the peripheral areas have particularly satisfactory public transport services if judged by the levels of dissatisfaction expressed by households and users in the city.

Table 8: Summary of key performance indicators of the transport system in Tshwane

Key Performance Indicator	KPI Target	Status for the City of Tshwane as a whole	KPI Zones which do not achieve the target
Travel time for work trips	Less than 1 hour	48.4 minutes	N W Periphery, Soshanguve, Temba and Eastern Corridor
Travel time for work trips by public transport	Less than 1 hour	66.5 minutes	N W Periphery, Soshanguve, Temba, Atteridgeville and Eastern Corridor and periphery
Percentage of public transport users spending more than 10% of disposable income on transport to work	10% specified as maximum	4% spend more than 10%	All, with the exception of Old East and New East
Percentage of motorised trips to work by public transport	80 per cent	53.2 per cent	All the low-density suburbs and the CBD
Walking times to trains	15 minutes (less than about 2 km)	36.1% walk longer than 15 minutes	Wonderboom, Atteridgeville, Eastern Corridor
Walking times to buses	15 minutes (less than about 2 km)	6.2% walk longer than 15 minutes	Rooiwal
Walking times to minibus-taxis	15 minutes (less than about 2 km)	5.6% walk longer than 15 minutes	None
Dissatisfaction about distances from homes to stations	As above	52% dissatisfied	Northern & N W Periphery, 18. Worst case 95% dissatisfied
Dissatisfaction about Bus fares	Not specified Use 50% to define need	37% dissatisfied	11
Dissatisfaction with facilities at bus stops	Not specified Use 50% to define need	54% dissatisfied	Peripheral areas but most parts of the city
Dissatisfaction with lack of safety from accidents in taxis	Not specified Use 50% to define need	60% dissatisfied	Most parts of the city
Dissatisfaction with lack of facilities at ranks	Not specified	50% dissatisfied	Most areas

Taken as a whole, the KPI evaluation reveals that infrastructure in the city is well developed and in good condition, except in the peripheral low-income settlements to the north and to a lesser degree the eastern periphery.

Train services are generally inaccessible and bus services are dispersed, with low frequencies particularly in off-peak periods. By world standards fares are cheap on account of the level of subsidisation. Nevertheless, a large proportion of users of buses and minibus-taxis are dissatisfied with the cost of fares.

There is widespread dissatisfaction about the absence of facilities at bus stops and minibus-taxi ranks. Finally, most users are dissatisfied about the lack of safety from accidents in minibus-taxis. Other complaints relate to bad behaviour and speeding by drivers and the almost constant violence between rival operators. Many train users are concerned about a lack of security on trains.

The foregoing consumer concerns do not paint an optimistic picture of the state of readiness of the public transport system to accommodate the requirements of visitors to the 2010 FWC.

5. CONCLUSION

Based on the evidence presented, Tshwane and for that matter most South African cities, have transport infrastructure which can adequately meet demand, provided some strategic upgrading is provided. This need not be extensive. Tshwane will manage the 2010 FWC challenge with ease, provided that adequate traffic management measures are applied. These will include congestion management and traffic diversion, priority lanes for public transport at critical points, and improvements to assembly points (interchanges) and passenger waiting and loading points in a few specific locations adjacent to high frequency services. Pedestrian access to loading points will need to be upgraded with surfaced walkways, lighting and directional signs. These short-term improvements can be implemented at relatively low cost. There is a proviso, however, namely that the improvements should be based on an accurate estimation of the demands for movement. These should be based on estimates of the number of visitors, the schedule of games and stadium capacities, and the location of accommodation, the venues, airports and local tourist, recreational and shopping attractions.

To return to the Sydney framework as a model to indicate how Tshwane can commence the process of advancing its position in a global and increasingly competitive environment, it is evident from the performance analysis that at present only infrastructure development provides any form of global competitiveness. Existing levels of economic development, quality of life and environmental sustainability do not score well because of the condition of the majority of the population with respect to income, employment, access to urban opportunities and a general lack of mobility.

Figure 19 provides an indication as to how improvements to the transport system can be a catalyst for improvement in economic performance and quality of life in particular. The 2010 FWC can be used to kick-start the necessary transport improvements particularly between the inner city and the environs of the Tshwane site/s for the FWC. The 2010 FWC is, however, a short-term intervention and should not be seen as the only intervention necessary to make our cities more internationally competitive. Long-term considerations are far more important.

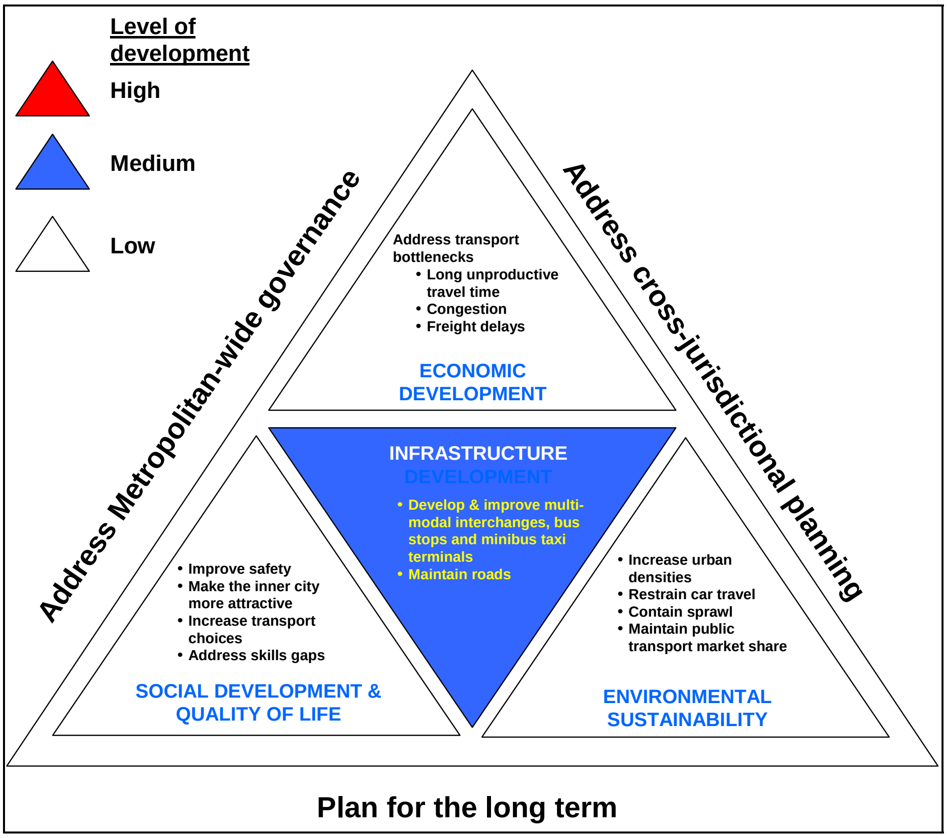

Figure 17: A framework for targeting strategic actions for city development

Of particular significance in the framework are the three cross-cutting injunctions to:

(i) address metropolitan-wide governance;
(ii) address cross-jurisdictional planning; and
(iii) plan for the longer-term future.

On account of the political legacy, there has been an understandable emphasis on some parts of the city and relative neglect of others in the last decade. Despite the Integrated Development Plans, many sectors still work in silos, and some services, such as transport, have experienced low priority and have declined in quality. Most important, the emphasis on delivery has placed emphasis on short-term investments, rather than those with long-term horizons and benefits, such as mass public transport systems. If London had not had the underground, it would not be enjoying a pre-eminent position as a global city and the leading world financial centre.

6. REFERENCES

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