# NATIONAL LAND TRANSPORT KEY PERFORMANCE INDICATORS (KPI'S) AS A MEASUREMENT OF SUSTAINABLE TRANSPORT: ARE WE MEASURING THE RIGHT THINGS?

**Krynauw, M.N. and Cameron, J.W.M.**

Tshwane Metropolitan Municipality, PO Box 6338, Pretoria 0001.
TRC Africa (Pty) Ltd., PO Box 95230, Pretoria 0145.

## ABSTRACT

The measurement of performance, or performance monitoring, is a requirement of the National Land Transport Transition Act (2000). At the same time performance measurement is also required from transport planning authorities at the local sphere of government through the Municipal Systems Act (2000). Through the activities in and around the recent World Summit for Sustainable Development (2002), the debate about performance monitoring has been re-opened in terms of the meaning of sustainable transport in the developing world.

The paper will firstly look at the linkage between performance measurement and decision–making. This will be followed by a look at some international ideas about sustainable development and its measurement within the transport sector. From the literature it can be deduced that there is a major difference between traditional transport planning and transport planning in support of sustainability.

The second part of the paper will look at key performance indicators measured in Johannesburg at the end of 2002 and the beginning of 2003 in terms of the draft National Land Transport Strategic Framework (2002) and the Gauteng Provincial Land Transport Framework (2002). Some of these measurements were done in terms of data derived from the 1996 census. Some analysis will be done on the relevance of these measures to cities in South Africa, which have dual economies with a mix of modern and developing sectors.

The third part of the paper will look at some emerging patterns and critically analyse the measured KPIs against other KPIs that are perhaps more relevant to South Africa given the authors' emphasis on sustainable transport. The paper will be concluded with recommendations on the relevance of the current transport KPIs to cities in South Africa.

## 1. INTRODUCTION

The White Paper on National Transport Policy (National Department of Transport (NDOT), 1996) determined a number of strategic objectives for land passenger transport in the Republic of South Africa (RSA). These strategic objectives suggested certain targets to improve the condition of the transport system. The targets were based on an analysis of critical issues and problems facing land transport in South Africa at the time. Amongst the issues which were stressed were the supply-driven public transport system, neglect of customers and the inefficient implementation of public transport subsidisation.

"Moving South Africa – The Action Agenda", (MSA, 1998) which set out the NDOT's strategic vision for transport in the horizon year 2020, took the strategic targets of the White Paper further and suggested strategies which could be used to achieve them. The results of the White Paper and MSA have now been incorporated into legislation intended to implement the transport policies and strategies. The relevant legislation is the National Land Transport Transition Act (Act No. 22 of

2000). Included in the NLTTA are provisions for monitoring the performance of the public transport system and measuring performance in respect of Key Performance Indicators (KPIs).

A set of KPIs have been incorporated in the short-term strategy of the NDOT, namely the draft National Land Transport Strategic Framework (2002). A similar set of KPIs has been incorporated in the Gauteng Provincial Transport (GAUTRANS) Planning Specifications in the year 2002.

It is appropriate that national practise should be subjected to evaluation and review. It is the authors' opinion that the South African KPIs may be too extensive and expensive and that in the light of scarce resources, it may advisable to look at the poor performance of the transport system in the RSA from the perspective of sustainable development and its corollary sustainable transport. This is the main purpose of this paper.

## 2. LEGISLATIVE REQUIREMENTS FOR THE MEASUREMENT OF THE PERFORMANCE OF MUNICIPAL SYSTEMS

### 2.1 National Land Transport Transition Act (Act 22 of 2000)

In terms of the National Land Transport Transition Act (NLTTA) (Act 22 of 2000), the Minister must annually prepare an National Land Transport Strategic Framework (NLSTP) for the country for a five-year period. This strategic framework must set out the national transport Key Performance Indicators (KPIs). Provinces and municipalities will, after providing the Minister with the required information, be monitored in terms of the implementation of national transport policy. In addition, the KPIs will provide information for transport planning thereby assisting all spheres of government in making decisions on investment in transport.

Every province (MEC for Transport) must also annually prepare a Provincial Land Transport Framework (PLTF), which must *inter alia* set out the key performance indicators specified by the Minister, as well as any others specified by the MEC. These are to be used to measure the performance of the provincial and municipal transport systems and administrations in the light of their functions and responsibilities in terms of the NLTTA.

It is important to note the distinction between:

- System performance (e.g. travel time, travel cost, access times etc); and
- Administrative performance (e.g. response times to repair system breakdowns such as traffic signals, road potholes and traffic accidents).

KPIs for sustainable transport may relate to both system and administrative performance. In the use of these different measures, the questions raised may be different, namely:

- can the system be maintained and extended to meet the needs of present and future generations within resource constraints and environmental considerations which would characterise a sustainable transport system? or
- has the administration invested wisely so as to ensure that recurrent costs will be affordable in future?

Public transport subsidies and their declining productivity in South Africa are an example of unsustainable performance in the administrative sense.

2.2 Local Government: Municipal Systems Act (Act 32 of 2000)

Section 107 of the Local Government: Municipal Systems Act (Act 32 of 2000) states that the Minister (for local government) may require municipalities of any category to submit to a specified national organ of state, such information concerning their affairs as may be required. A Cabinet member, after consulting the Minister (for local government), may exercise the power contained above in relation to a municipal service or a matter falling within the functional area for which the Cabinet member is responsible.

## 3. FROM PERFORMANCE MEASURES TO TRANSPORT DECISION-MAKING

Performance measurement can play a critical role in influencing transport planning authorities' decisions in terms of policy development and resource allocation. Measurement therefore becomes a means to an end. At the same time, it is clear that critical to the process is the selection of the "right" means to an end. Pickrell and Neumann state that this should be a systematic, ongoing process, also known as *performance-based planning* that must be integrated into an authority's ongoing, management and decision-making process. Figure 1 depicts a simplified transport planning process and illustrates how the elements of the process interact to create *a modified performance-based planning process.*

The key elements in this process are:

- Broad goals;
- Objectives;
- Performance measures;
- Analytic measures and data needs;
- Decision support
- Monitoring and feedback; and
- Communicating and reporting results.

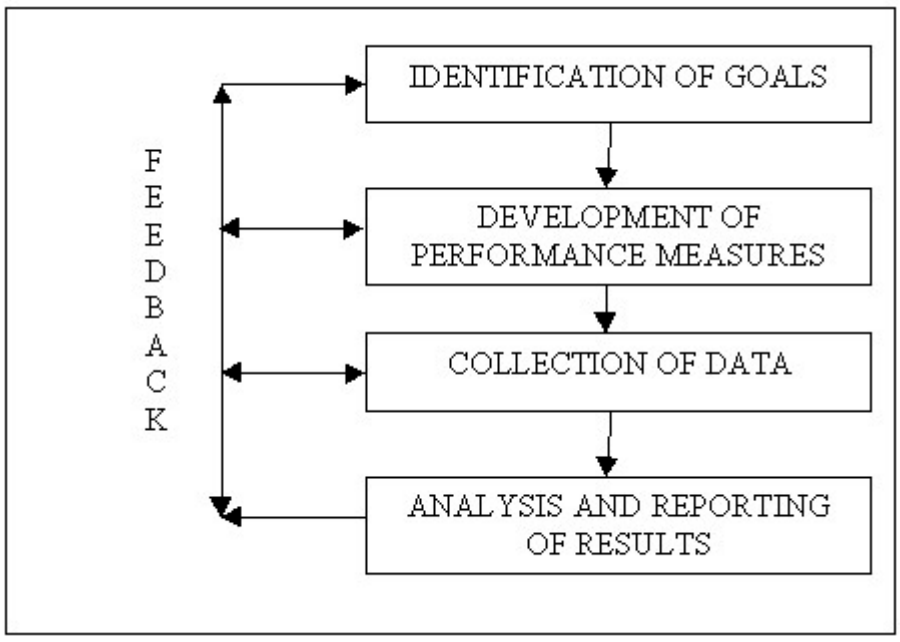


Figure 1. Our stages of performance measurement (simplified).

The following *six good business factors* support the need to link performance measurement to the decision-making process:

- Accountability;
- Efficiency;

- Effectiveness;
- Communications;
- Clarity; and
- Improvement over time

In a resource paper on "Implementing Performance Measurement in Transportation Agencies", Kassoff summarised *key lessons learned* in the United States of America as:

- Adopt a limited number of important measures with clear purpose;
- Measure only what you are sure you need;
- If you measure too much, cost will soar while focus fades;
- Measures and presentations should be as simple and straightforward as possible;
- Make the system to implement performance measurement simple and supportive;
- There is no perfect measure, so do not waste time and money in an effort to find it;
- If you measure the wrong things, they are what you will be held accountable for;
- Avoid the unintended consequences that can result from imperfect or incomplete measuring systems;
- Be wary of misinterpreting and misuse of information; and
- Performance measures may not survive a significant change in leadership priorities unless they have widespread and deep-rooted support, so –
  - involve stakeholders in deciding what to measure, how to measure and when to measure and what to do with the results;
  - use measures to tell the "true" story, while focusing on opportunities and not allocating blame;
  - question everything; and
  - continuously improve.

## 4. FROM SUSTAINABLE DEVELOPMENT TO SUSTAINABLE TRANSPORT

The concept of sustainable development has become a global mission since the 1992 United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil. This commitment was confirmed and further developed at the recently held World Summit on Sustainable Development that was held in Johannesburg, South Africa in August 2002. Today there are many different perspectives and views on sustainable development. The core or base definition of sustainable development, however, remains as was defined in 1987 by the World Commission on Environment and Development (WCED) – the so-called Brundtland Commission. *The WCED defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*

*Zuidgeest* came to the conclusion that the following aspects seem to be important in the definition of sustainable development:

- Sustainable development is a process;
- Intergenerational justice is important;
- The use of resources is a key element; and
- Measurability of the definition seems to be problematic.

In terms of the Brundtland Commission's definition of sustainable development, sustainable transport can simplistically be defined as *"meeting present transport needs without compromising the ability of future generations to meet their own transport needs".* As in the case of sustainable development, much has been written in recent years on the topic of sustainable transport.

Today, at least three types of definitions can be distinguished:

- Ecological (traditional) definitions;
- Integrated definitions; and
- Process driven definitions.

In an attempt to integrate the different perspectives on sustainable transport, Akinyemi and Zuidgeest defined a sustainable transportation system as "a transportation system that meets the people's needs, i.e. in terms of mobility, accessibility and safety within the available or affordable environmental, financial and social resources".

*Akinyemi and Galega* reported at Codatu VIII (1998) in Cape Town that they came to the conclusion that "the current understanding of the concept of sustainable transport is inadequate. It basically denotes (an) efficient and not necessarily (a) cost-effective transport (system). In addition, a sustainable transport system seems to represent one which fits the existing conditions in a society rather than one which improves (or will improve) the conditions in the society. Furthermore, there are no operational criteria for sustainability. Thus, it is difficult to accurately assess the sustainability of existing facilities or services in many cities".

In 1997, the *Canadian Centre for Sustainable Transport (CST)* developed a comprehensive definition of sustainable transportation. In terms of this definition, a sustainable transport system is one that:

- Allows the basic access needs of individuals to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations;
- Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy;
- Limits emissions and waste within the planet's ability to absorb them, minimizes - consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, re-uses and recycles its components, and minimizes the use of land and the production of noise.

Under the heading*: "What is Sustainable Transportation",* Todd Litman of the Victoria Transport Policy Institute, in a report: "Re-inventing Transportation – Exploring the Paradigm Shift Needed to Reconcile Transportation and Sustainability Objectives", stated that "sustainability has significant implications for transportation planning, since transport activities tend to be highly resource intensive, have numerous external costs, and frequently distribute impacts inequitably. Sustainable transport requires using each mode for what it does best, which typically means greater reliance on non-motorised transport for local travel, increased use of public transit in urban areas and a reduction (but not elimination) of personal automobile use". To further explain, Litman provided a very useful table in his report indicating the difference between conventional transport planning and planning for sustainable transport (Table 1).

Litman concluded his report by stating: "Sustainable development requires significant changes in our transportation system to increase economic efficiency, equity and environmental security. This can not be achieved simply by changing vehicle designs or improving traffic flow. It requires changing the way transportation professionals approach problems and how individuals behave as citizens and consumers". From the above it is clear that for a transport system to be developed in a sustainable environment, it cannot be done on a "business as usual" basis. Sustainable transport must be reflected in the goals and objectives of transport (planning) authorities. At the same time, performance measurement of the activities of these authorities must be able to reflect progress or non-progress in terms of sustainability.

Table 1. Conventional vs Sustainable Transportation Planning.

| | **Conventional Planning** | **Sustainable Planning** |
|---|---|---|
| Transportation | Defines and measures transportation primarily in terms of vehicle travel | Defines and measures transportation in terms of access |
| Objectives | Maximise road and parking capacity to meet predicted traffic demand | Uses economic analysis to determine optimal policies and investments |
| Public Involvement | Modest to moderate public involvement. Public is invited to comment at specific points in the planning process | Moderate to high public involvement. Public is involved at many points in the planning process. |
| Facility Costs | Considers costs to a specific agency or level of government | Considers all facility costs, including costs to other levels of government and costs to businesses (such as parking). |
| User Costs | Considers user time, vehicle operating costs, and fares or tolls | Considers use time, vehicle operating and ownership costs, fares and tolls. |
| External Costs | May consider local air pollution costs. | Considers local and global air pollution, down-stream congestion, uncompensated accident damages, impacts on other road users, and other identified impacts. |
| Equity | Considers a limited range of equity issues. Addresses equity primarily by subsidising transit | Considers a wide range of equity issues. Favours transportation policies that improve access for non-drivers and disadvantaged populations. |
| Travel Demand | Defines travel demand based on existing user costs. | Defines travel demand as a function, based on various levels of user costs. |
| Generated Traffic/Induced Travel | Ignores altogether, or may incorporate limited feedback into modelling. | Takes generated traffic into account in modelling and economic evaluation of alternative policies and investments. |
| Integration With Strategic Planning | Considers community land use plans as an input to transportation modelling. | Individual transportation decisions are selected to support community's strategic vision. Transportation decisions are recognised as having land use impacts. |
| Investment Policy | Based on existing funding mechanisms that target money by mode. | Least-cost planning allows resources to be used for the most cost-effective solution. |
| Pricing | Road and parking facilities are free, or priced for cost recovery. | Road and parking facilities are priced for cost recovery and based on marginal costs to encourage economic efficiency. |
| Transportation Demand Management | Uses TDM only where increasing roadway or parking capacity is considered infeasible (i.e. large cities and central business districts. | Implements TDM wherever possible. Capacity expansion only occurs where TDM is not cost effective. Considers a wide range of TDM strategies. |

As a departure point it has to be agreed that current private motor vehicle use in South Africa is both inequitable and unsustainable. If we are serious about sustainable transport, severe measures will be necessary to curb private car use and general road building to satisfy rising demand. This objective suggests certain obvious performance measures.

## 5. SUSTAINABLE TRANSPORT PERFORMANCE INDICATORS AS PROPOSED BY VARIOUS INTERNATIONAL INSTITUTIONS

Over the past number of years, a number of organisations proposed performance indicators to measure performance in a more sustainable environment. One example of this is *UITP's "Millennium Cities Database for Sustainable Mobility"*. In collaboration with Professors Jeff Kenworthy and Felix Laube of Murdoch University, Australia, 66 "raw" indicators have been

investigated in 100 selected cities of which 60 conurbations are located in developed countries and 40 in emerging and developing countries.

At Codatu IX (2000) in Mexico City, two Russians researchers, *Bougromenko and Myasoedova*, reported that the strategic planning of sustainable development implies a shift from the technical, branch indices to humanitarian ones characterising standards of living. In the context of urban transport, they suggest that the solution lies in an *urban transport standard (UTS),* which should be the indices of end consumption of transport services minimally required to sustain normal living conditions, such as mobility, level of transport discrimination, level of ecological safety and net contribution of urban transport to the GDP.

In their paper they suggest the following *10 UTS indices:*
- Transport mobility of the population;
- Ratio of public to private transport means;
- Reliability of urban passenger transport;
- Level of transport discrimination of the population;
- Convenience of urban passenger transport;
- Specific lost free time of users of the system;
- Share of urban passenger transport in total pollution;
- Level of development of non-motorised transport;
- Accident level due to urban passenger transport; and
- Efficiency of urban passenger transport.

All 10 parameters of the UTS are determined for a specific city on the basis of the following two factors:
- Current level of development and structure; and
- Potential level of development and period of strategic planning.

The UTS can then be used to develop a "profile" for each city under investigation, which will give an indication of the future transport conditions in the city, accepting that all city departments will support the future transport system through their activities and actions.

The most recent development in the field of transport performance measurement is a practical, user-friendly Guidebook – "TCRP Report 88, A Guidebook for Developing a Transit Performance – Measurement System", released early in 2003 by *the Transportation Research Board (TRB).* Chapter 6 of this Guidebook contains 400 individual performance measures, and a series of selection menus to help users quickly identify measures appropriate to their particular authority's goals and resources. Another excellent resource document published by the TRB is Conference Proceedings 26: "Performance Measures to Improve Transportation Systems and Agency Operations", reporting on a conference that was held at Irvine, California from 29 October to 1 November 2000.

However, *for the purpose of comparison* with the proposed key performance indicators as contained in the draft National Land Transport Strategic Framework (2002), *the performance indicators as suggested by the Canadian Centre for Sustainable Transport (CST) will be further investigated.*

CST developed an initial set of 14 indicators following an investigation into 7 transport related topics, as indicated in Table 2. Possible shorter and longer term additions were also proposed. The CST indicators are also contrasted with South African KPIs in Table 2.

## 6. PERFORMANCE MONITORING IN SOUTH AFRICA

In the Draft National Land Transport Strategic Framework (NLSTF) (2002), two types of key performance indicators (KPIs) were identified:

- Customer-based indicators, which measure the performance of the land transport system from the customer's point of view; and
- NLTSF-based indicators. which measure the progress of the national and provincial Departments of Transport and municipalities in implementing the 13 strategies contained in the NLTSF.

The eight customer-based and the seven NLTSF-based indicators concentrate on the priority areas of:

- promotion of public transport usage;
- promotion of access to public transport; and
- traffic safety.

Early in 2002 the *Gauteng Transport Coordinating Committee (TCC)* approved "Specifications for the Measurement of Key Performance Indicators in Gauteng". Table 2 summarises the proposed NLSTF (2002) and Gautrans (2002) KPIs, in relation to CST's Strategic Transport Performance Indicators (STPI).

It is evident from Table 2 that there are significant differences between the indicators used by the NDOT in respect of monitoring the implementation of transport policy and those suggested in CST's initial indicator set. There are also differences between the National and Gautrans KPIs. One of the reasons for the latter is that the KPIs are expressed in different basic measurement units. Many of the required National KPIs can, however, be calculated from the indicators outlined in the Gautrans specifications. The main differences revealed by the table are the absence of any explicit concern about sustainability in the South African KPIs.

In CST's framework topics, on the other hand, a series of sustainability questions underlies the initial indicator set. These questions are manifest as follows:

- is the performance of the transport sector improving in respect of its adverse effects on environment and health?
- are land use, urban from and transport systems changing so as to reduce transportation effort?
- are we increasing the efficiency of use of current infrastructure and changing the service supply in sustainable ways?
- are the patterns of expenditure by governments, business and households and the associated pricing systems consistent with moving towards sustainability?;
- is technology being used more in ways that make vehicle transport systems and their utilisation more sustainable?
- how effectively are environmental management and monitoring tools being used to supply policy and decision-making towards sustainability? and
- is transport activity changing in directions consistent with positive answers to all the other questions?

Table 2. CST's initial set of Strategic Transport Performance Indicators in relation to the RSA draft National (NLTSF) and Gautrans (PLTF) KPIs.

| Framework topic | CST's Initial Indicator Set (STPI) | National KPI's | Gautrans KPI's |
|---|---|---|---|
| 1. Environment and health consequences of transport | 1. Use of fossil energy for all transport<br>2. Greenhouse gas emissions from all transport.<br>3. Index of emissions from air pollutants from road transport.<br>4. Index of incidence of injuries and fatalities from road transport. | 1. Number of road traffic fatalities per vehicle type<br>2. Number of road traffic pedestrian fatalities<br>3. Number of road traffic fatalities per 100 million vehicle kms by type. | 1. Road traffic fatalities per area.<br>2. Public transport fatalities per area.<br>3. Pedestrian fatalities per area. |
| 2. Transport activity | 5. Total motorised movement of people<br>6. Total motorised movement of freight<br>7. Share of passenger travel *not* held by land-based public transport.<br>8. Movement of light-duty passenger vehicles | 4. Average travel time to work<br>5. Public transport share of all motorised trips to work<br>6. Percentage of land freight tonnage transported by rail<br>7. Average percentage of overloaded trucks on national & provincial roads. | 4. Average travel time for work and education trips<br>5. Travel modes used for work and education trips.<br>6. Capacity and utilisation of roads & public transport facilities. |
| 3. Land use, urban form and accessibility | 9. Rate of use of urban land | 8. Access of rural people to public transport (% < 2 km)<br>9. Floor space and number of housing units developed in designated corridors in metropolitan areas. | 7. Access to public transport (all modes). |
| 4. Supply of transport infrastructure and services | 10. Length of paved roads | 10. Average age of public transport rolling stock by mode.<br>11. Percentage of minibus-taxi fleet recapitalised. | 8. Customer satisfaction with attributes of public transport modes<br>9. Lane km of freeways & arterials.<br>10. Condition of freeways & arterials.<br>11. Supply of bus & taxi bays. |
| 5. Transportation expenditures and pricing | 11. Index of relative household transport costs<br>12. Index of the relative cost of urban transit | 12. Percentage of households spending more than 10% of disposable income on public transport. | 12. Average travel cost for work and education trips.<br>13. Operating subsidies per area of origin of bus passengers.<br>14. Annual expenditure target for infrastructure and operations. |
| 6. Technology adoption | 13. Index of energy intensity of the road vehicle-fleet<br>14. Index of emissions intensity of the road-vehicle fleet | | |
| 7. Implementation and monitoring | | 13. Percentage of subsidised bus services operating in terms of tendered or negotiated contracts.<br>14. Expenditure by government in 13 priority rural nodes for infrastructure and operations.<br>15. Percentage of NLTSF funding needs sourced from different levels of government. | |

While the concerns about sustainability are explicit in CST's set of performance indicators, they are not explicitly stated in the case of national and provincial KPIs in South Africa. A lot depends on the interpretation of the results of performance measurement. Accordingly, it is evident from Table 2 that both national and Gauteng KPIs could be used to measure the sustainability of transport systems, in some or other way. The authors believe that this needs to be made a more explicit component of transport policy.

## 7. SOME PATTERNS REVEALED BY PERFORMANCE MONITORING IN THE GAUTENG PROVINCE, SOUTH AFRICA

The information which follows is based on the first round of performance monitoring under the guidance of the Gautrans specifications for KPIs in line with national and provincial transport policy. A number of the indicators have been selected to demonstrate that they can be used to assess the sustainability of the transport system, particularly over time. An example has been selected from Johannesburg Metropolitan Municipality. Figure 2 shows Johannesburg's administrative regions which were used for monitoring the performance of the transport system in 2002.

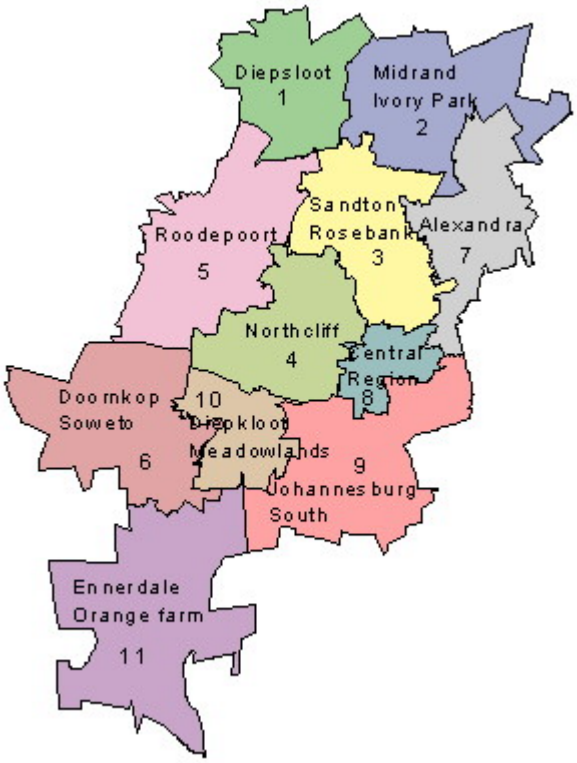


Figure 2. Johannesburg's Administrative Regions.

Table 3 provides the results of some of the monitoring from a transport customer perspective. The proportion of the worker population in each part of the city (region) which is captive to public transport is shown in Table 3. It is notable that the regions with the highest proportion of public transport captives are also those on the periphery of the city in Diepsloot, Ivory Park, Soweto, Alexandra, Diepkloof and Ennerdale/Orange Farm.

As is evident from the table, the public transport captives have the lowest average monthly incomes and travel the greatest distances to work. The converse applies, in that the persons with the highest average monthly income live closest to the centre of the metropolitan region, travel the shortest time and spend the lowest proportion of their income on their work trips.

Table 3. Transport Characteristics of regions in Johannesburg 2002.

| | Area | % Captive to public transport | Average monthly income (R/month) | Average travel time to work (min.) | % spending + 10% income on work trip | % dissatisfied with cost of work trip | |
|---|---|---|---|---|---|---|---|
| | | | | | | Taxi users | Bus Users |
| 1. | Diepsloot | 54 | 3990 | 53 | 39 | 51 | 61 |
| 2. | Midrand/Ivory Park | 49 | 6387 | 48 | 50 | 56 | 21 |
| 3. | Sandton | 5 | 16 382 | 28 | 33 | 32 | 28 |
| 4. | Northcliff | 16 | 10 238 | 34 | 31 | 28 | 43 |
| 5. | Roodepoort | 7 | 15 110 | 38 | 32 | 39 | 33 |
| 6. | Soweto | 77 | 2 366 | 66 | 49 | 52 | 45 |
| 7. | Alexandra | 56 | 4 195 | 44 | 55 | 56 | 40 |
| 8. | Inner city | 49 | 3 901 | 38 | 49 | 50 | 22 |
| 9. | Jo'burg South | 19 | 7 737 | 35 | 34 | 50 | 44 |
| 10. | Diepkloof | 72 | 2 529 | 56 | 48 | 39 | 31 |
| 11. | Ennerdale/Orange Farm | 47 | 2 827 | 58 | 63 | 47 | 42 |
| | **ALL** | **47** | **5 662** | **46** | **54** | **48** | **36** |

Source: Gautrans Household Travel Survey (2002).

Accordingly, in South Africa it is imperative that we concern ourselves with regional and community equity before we worry about generational equity. If the present equity problem is not addressed, the negative implications will be magnified in the next generation.

The extent of dissatisfaction with public transport provides a strong indication that these travel times and costs will be unsustainable in the long run. The highest level of dissatisfaction with cost (where over 50 per cent of the population are dissatisfied) occurs in Diepsloot, where there is no subsidised public transport, and in Alexandra and Soweto.

The other main sources of dissatisfaction are the low quality of minibus-taxi services, the absence of facilities at taxi ranks and stations, and the low frequency of both peak and off-peak services.

The foregoing does not paint a picture of a highly sustainable transport system, particularly public transport services. If one bears in mind that rail rolling stock and passenger public service vehicles are all antiquated, the potential for sustaining public transport in South Africa appears to be extremely low. Train rolling stock is over 25 years old on average, buses around 12 years and minibus-taxis between 9 and 10 years.

These indicators will be tracked periodically and any further deterioration will indicate the extent of the unsustainability of the system. It should be noted that the same indicators were used by "*Moving South Africa*" to highlight strategic challenges and the lack of sustainability of the transport system in South Africa. It will be imperative that all 3 levels of government provide policies and strategies which address these problems timeously. With every passing year it is becoming more expensive to satisfy the access and mobility needs of the population.

## 8. CONCLUSIONS

South African transport KPIs as currently proposed in the draft NLTSF (2002), can be used to measure the sustainability of the transport system from an operational and costing perspective. They do not, however, reflect directly on other aspects of sustainability including the intensity and efficiency of energy use, the intensity of emissions of the road vehicle fleet, and the environmental and health consequences of energy consumption, emissions and road accidents. It will be advisable for government to review its proposed KPIs to encompass these aspects of sustainable transport. In doing so, government needs to explicitly address the trade-off between the admittedly high capital costs of upgrading, extending and modernising the public transport system, against the equally high and environmentally disastrous long-term costs of allowing private motor car use and resultant urban sprawl to consume valuable agricultural land.

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**Krynauw, M.N. and Cameron, J.W.M.**

Tshwane Metropolitan Municipality, P O Box 6338, Pretoria 0001.
TRC Africa (Pty) Ltd., P O Box 95230, Pretoria 0145.

## Biography

Mike Krynauw was born in Stellenbosch in the Western Cape, where he obtained his first degree in civil engineering from the University of Stellenbosch in 1977. He is a transportation engineer from profession with honors degrees in civil engineering (UP) and public administration (UNISA). His special fields of interest are integrated transport planning and sustainable transport. He has worked for the then Transvaal Roads Branch for 13 years. In 1990 he was promoted to the National Department of Transport, where he spent most of his 7 years on strategic planning within the urban transport environment. He is currently an acting manager at the City of Tshwane Metropolitan Municipality responsible for integrated transport planning. Mike was the chairperson of the national Land Transport Coordinating Committee's (LTCC) Planning Guidelines Sub-committee responsible for the preparation of a number of Transport Planning Guideline and Requirement (TPG and TPR) documents. He also acted as chairperson of LTCC for a year. He has recently been elected as convenor of the Transport Technical Committee of the South African Local Government Association (SALGA). He is also heavily involved with the activities of the South African Cities Network’s Transport Work Group.