

TRAVEL DEMAND MANAGEMENT IN THE CITY OF CAPE TOWN

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ABSTRACT

Sustainable Transport is about finding ways to move people, goods and information in a manner that reduce its impact on the environment, the economy and society, today and into the future. The City of Cape Town has incorporated sustainability as an important and overarching theme in its Integrated Transport Plan (2006 – 2011) and has identified Travel Demand Management (TDM) as a critical mechanism towards a shift to a more balanced and sustainable transport system.

The City of Cape Town has formulated a number of strategies that aim to influence travel behaviour for the purpose of reducing and/or redistributing travel demand. The three main TDM strategies that the City is focussing on are the upgrade of Park-and-Ride facilities, large employer programmes and the promotion of higher occupancy vehicles. The upgrade of Park-and-Ride facilities at rail stations across the metropolitan area is the first of these that is currently being implemented.

Rail stations were evaluated in order to determine their potential in reducing private car travel by attracting car users to rail. Factors that were considered in the evaluation included: human factors, station attributes, urban environment at stations and marketing of stations. It was concluded that capital interventions in Park-and-Ride facilities alone would not result in long term travel behaviour changes. Rather, a sustainable shift in travel behaviour would require a supportive management system.

INTRODUCTION

Background

The transport sector in South Africa is the largest energy consumer of all sectors, which has major environmental, social and economic implications and it is one of the major contributors to air pollution in major cities. In Cape Town, the transport sector accounts for 54 % of the total energy consumption, and is responsible for 28% of all carbon emissions in the metro (Cape Town, 2003).

As a result of land development patterns, economic activity and the social needs of its people, South Africa has experienced an increase in the demand for transportation. Most large cities in South Africa are faced with challenges such as growing trends in private vehicle usage, increasing congestion, major arterials nearing capacity, major traffic peak period spreading and commuting distances increasing.

In Cape Town, the average daily traffic on the major metropolitan roads has been increasing by two and a half percent per year over the last fifteen years and, traffic congestion to/from the Central Business District (CBD) has reached a point at which further growth in peak-period trips (Cape Town, 2006a) is constrained. With an unsafe, inefficient and unreliable public transport system, the preferred mode is the private vehicle which is environmentally unsustainable and economically inefficient.

Transport policies have traditionally prioritised the private vehicle over public transport. The focus has been on the supply side of road transport by accommodating increasing traffic with the provision of additional road space, with limited focus on transport demand management (Ferguson, 2000). This is typically emphasised by the perception that adding more capacity, i.e. building more roads reduces congestion. However; in most of the major cities in South Africa, the road networks are being used at capacity with limited scope for expansion of the networks due to space and

budget constraints. In addition, there has been growing awareness by decision makers about the detrimental environmental impacts of the private vehicle (Sustainable Energy Africa, 2006).

The City of Cape Town's move towards sustainable transport

The City of Cape Town has recognised the important role that transport plays in society, the economy and in sustaining the environment and has therefore incorporated sustainability as an important and overarching theme in its Integrated Transport Plan (ITP). This is evident in the ITP's vision which aims "to provide a world class sustainable transport system that moves all its people and goods effectively, efficiently, safely and affordably" (Cape Town, 2006).

Sustainable Transport is about finding ways to move people, goods and information in a manner that limits the impact on the environment, the economy, and society, today and into the future. This approach looks at supporting those lifestyles and movement patterns, which depend least on non-renewable and polluting resources. It encourages walking, cycling and public transport use over private vehicle use and it supports integrated planning approaches which move towards sustainable cities (Tran:SIT, 2007).

Various policies and strategies have been formulated and priority projects within the City have been identified to develop an effective transport system that promotes sustainability. These aim to promote alternative and more efficient modes of transport and to reduce the usage and dependence on private vehicle trips.

The City has recognised the need to shift from the provision of additional roadway capacity to a greater understanding of the demand for travel and associated behavioural mechanisms. Accordingly, Travel Demand Management (TDM) has been included in the ITP as a key mechanism in developing a more sustainable transport system by encouraging a shift from single occupancy car travel to higher occupancy modes and Non-motorised Transport (NMT).

Methodology

The paper is divided into three sections. Firstly, the City's TDM Strategy described in Chapter 2, highlighting the different strategies employed to reach the goals of the policies. Secondly, the City's Rail Park and Ride project is described in more detail to illustrate how the potential impact of such a strategy could be realised. Finally, a discussion is included of the authors' interpretation of the policy and strategies, including how they believe this could be adapted for greater effectiveness.

TRAVEL DEMAND MANAGEMENT

Goals & Objectives

In 2006, the City of Cape Town produced a report entitled "Influencing Travel Behaviour – Towards a Travel Demand Management Strategy" (Cape Town, 2006b), which highlighted the need for and approach to the implementation of a Travel Demand Management (TDM) Strategy. It identified that the specific objective for TDM in the City of Cape Town is to:

"...promote a diversity of sustainable travel modes and practices that will influence the choices made by commuters in order to reduce the overall number of trips, minimize travel time and optimise travel cost - especially during peak times".

It highlights that the essence of the TDM objective is essentially threefold:

- Reduce the use of single occupant vehicles. Create an awareness of alternatives to private car use and change the perceptions in the minds of the travelling public and that of business that car travel is not the only feasible alternative and at the same time communicating the true cost of travel and the long-term sustainability of the system.
- Increase the use of public transport and non-motorised transport, supporting feasible and attractive alternative travel modes.

- Develop land use activities that will support the use of alternative modes as well as a supporting legal and policy environment.

The report states that no TDM measure will be successful without efforts in pursuing all three of the above objectives. In pursuit of the objective for TDM, key policy statements and strategies were identified to guide the development and implementation of TDM in the City. The following four focus areas were identified to implement the TDM strategies:

- 1a. Mode: Incentives to use alternative modes
- 1b. Mode: Disincentives to use single occupancy vehicles (SOV's)
2. User: Education and awareness
3. Land use
4. Strategies and Policy management

Strategies

In order to reach the objectives of TDM, the City could implement a variety of strategies, with incentive and disincentive measures. The following six TDM strategies were identified for implementation in Cape Town:

- Implement park-and-ride facilities
- Roll out programmes for Large Employers
- Promote Higher Vehicle Occupancies
- Continued marketing of TDM and Public Transport
- Develop Supporting Policies and Tax Incentives
- Develop a possible congestion pricing and ITS programme for the City

Strategies that create incentives to shift towards more sustainable modes of transport were prioritised above those that create disincentives to private car use. It is believed that this approach will have a higher likelihood of sustainable change in travel behaviour. Business Plans were developed for each of the first three strategies.

Implementation of Park-and-Ride facilities

While a small number of bus Park-and-Ride facilities have been established throughout the City, these are largely informal facilities on temporary sites. However, the City of Cape Town is currently busy implementing Park-and-Ride facilities at various rail stations across the metro, which will be discussed in more detail in Chapter 3.

Programmes for Large Employers

The City of Cape Town currently has no official transportation related programme for large employees and there are currently few incentives for large employers to assist employees in their daily commute. Accordingly, the objective of this project is to develop partnerships and programmes between the City of Cape Town and four other large employers, in order to assist large employers to focus on the travel needs of their employees in an effort to reduce congestion, reduce energy use and reduce pollutants per commuter.

The steps of the programme are as follows:

- Identify four large employers (in addition to the City of Cape Town) in the CBD that would be prepared to initiate a pilot programme to encourage employees to use other modes of transportation.
- Develop a pilot programme in conjunction with the large employers to assist them in reducing the number of single vehicles trips to/from the company. This programme could include encouraging car-pooling through preferential parking for car-pools, subsidies or rewards for car-pools, subsidising public transport tickets, work-at-home programmes through tele-commuting, subsidies for bicycles and providing bicycle parking.

Promotion of Higher Occupancy Vehicles

Ride sharing and/or car-pooling would be promoted under this strategy. This intervention is necessary because a large number of private motor vehicle trips during peak hours are single occupancy trips. The strategy to promote higher vehicle occupancies will essentially focus on the following:

- *Car-pooling desk* - Establish a phone-in service where commuters can obtain information on how to car-pool, how to start a car-pool, what the legal issues are, the different ways to share costs, and to provide realistic cost estimates of travelling. This would be accompanied with a marketing campaign to make users aware of the service.
- *Car-pool website* - Establish a website with information regarding all aspects of car-pooling. This website can also include options to match commuters who would like to share rides and must coincide with a marketing campaign to make users aware of the service.
- Establish additional high occupancy vehicle lanes and extend the lengths of existing lanes.

IMPLEMENTING RAIL PARK-AND-RIDE FACILITIES

Rail Park-and-Ride in context

Rail services have developed, and largely still operate, as commuter services, mainly towards the Cape Town CBD, with significantly lower frequencies in the off-peak. Rail stations therefore operate mainly during commuter peaks with very low levels of activity at most stations for long periods of the day. Rail Park-and-Ride facilities are aimed at residents from communities adjacent to each station. There are no major Park-and-Ride facilities on the periphery of the City aimed at intercepting the final leg of long distance trips.

Thus, the current trend is for commuters to leave their cars at various small stations for the day. Low levels of activity mean low surveillance at many stations, which makes station parking susceptible to crime. This is driving many potential rail passengers to drive directly to their destination. While safe parking at a station is only a small component in the total daily journey, the potential financial risk results in a weak link.

Human factors affecting modal shift

In order to correctly implement this Park-and-Ride Strategy, it is important to understand the human factors involved in making travel decisions, which is where travel behaviour could be influenced.

In a recent study that investigated user attitude towards the use of rail in Cape Town, Wright (2007) found that the factors below are likely to influence a person's decision to shift to rail. Many of the perceptions people had before exposure to trains were more negative than the reality. While the actual knowledge of some factors is sufficient to achieve a modal shift, others like security would require much more convincing evidence over a longer period to have a meaningful impact on modal shift in a community.

- **Travel time:** Perceived travel times could influence choice riders negatively to use train services more frequently. A large shift to rail will result in a easing of congestion levels on the road network with an associated reduction in travel time by car. This would attract some users back to car. Such a repetitive process will reach an equilibrium point where travel time is balanced between the modes for users particularly sensitive to travel time. Periods of lower congestion like school holidays are likely to see a shift back to car.

The impact of this factor is sensitive to individuals' perceptions about the value of their time. Restricting parking at the destination would result in longer walking distances or longer circulation time before finding a bay and would be a further tool to influence this factor.

- **Travel cost:** It is assumed that local users currently compare out-of-pocket car travel cost, as opposed to total car travel cost, with the cost of rail for particular trips. It is therefore unlikely that a shift to rail based on trip cost would lead to a decision to sell one of the household's cars. A single day train ticket cost constitute a saving compared to both actual and perceived car operating costs, with significant further savings achieved through weekly and especially monthly tickets.

The recent shift to public transport services could be attributed to the significant rise in fuel price over the first half of 2008. However, as the oil price, and hence the petrol price reduce there will probably be a shift back to car. The impact of this factor is therefore very sensitive to determinants like the petrol price. Travel cost could, however, also be influenced by the price of parking at the destination.

- **Convenience:** It was found that the ability to interact with people, read / work and not being in traffic were some of the advantages experienced by respondents. On the other hand, most negative responses related to train service punctuality and the condition of coaches.

Much of this factor depends on the management of the rail network and operations. Modernizing train sets as well as developing a new improved scheduling system should allow improved service rates. It may, however, be counter-productive to promote the modal shift before some or all these changes have been implemented to deliver the improved service.

- **Safety:** This refers to the risk of injury due to the operational characteristics of the mode. A British study found that, in 2002, fatalities in cars was 4 times higher than on rail. While comparative South African figures are not available, our disproportionately high car accident rates will probably mean that rail here is significantly safer. While important as a factor influencing modal shift, it is overshadowed by the security concerns.
- **Security:** This refers to the threat of injury to persons or damage to their property. While this factor appeared to be the biggest deterrent from using trains, respondents were slightly less concerned about their security after experiencing the rail service first hand.
- **Environmental Impact:** The per-person emission of certain harmful gasses is significantly higher for private cars than for rail. There is a global trend where people become aware of their carbon footprint and try to reduce it by reducing the time spent in cars. This factor has the potential of being a contributor to a sustainable modal shift.

The City's TDM study refers to estimations by Litman (2006) about the extent to which certain strategies can affect modal shift. It was found that different strategies would affect from 5% to 100% of vehicle travel in an area and that typical reductions in affected travel typically range between 10% and 30%. The total modal shift can therefore be expected to range between 1 and 8% of all trips, with higher percentages achieved for longer term strategies.

In an attempt to estimate the potential demand for parking at stations, it is assumed for this study that each effective change in attitude due to the above factors affecting user choice, would amount to a shift of 1.5% of the affected group. A positive change in all six aspects will therefore result in a 9% shift from car to rail. Table 1 shows the potential shift to rail for interventions affecting different factors in different income groups.

	Safety	Convenience	Total Shift
Lower Income	1.5%	0.5%	2.0%
Middle Income	1.5%	1.5%	3.0%

Table 1: Percentage Modal shift per Intervention

Table 1 indicates that between 2% and 3% of car users would shift to rail if the Park-and-Ride Strategy is successfully implemented.

Physical factors affecting modal shift

The Business Plan for implementation of the Rail Park-and-Ride highlights the following important determinants as described for the success of a Park-and-Ride facility in the USA (TCRP 95, 2004):

- Distance to Park-and-Ride
- Distance to destination (CBD for this study)
- Heavy congestion on roads
- High visibility of Park and Ride
- Easy access
- Lot spacing
- Surrounding urban density

In addition, the Business Plan also highlights the need for spare capacity on the rail system to which the modal shift is encouraged. These factors were used in the selection and prioritisation of stations earmarked for upgrade.

It goes beyond the scope of an upgrade project to influence factors such as rail capacity, the quality of feeder services and surrounding densities. Rather, these factors were analysed to find those stations where security and urban fabric improvements are likely to result in the highest modal shift, hence maximizing the benefit to cost ratio of the project budget.

Urban environment of rail stations

Cape Town stations are not typically integrated with other land uses and serve mainly as isolated ticket booths, toilets and waiting areas for passengers. This factor allows loitering and even criminal activities to occur at stations undetected, especially at smaller stations where ticket booths are only operated during commuter peaks.

There is a need and often also an opportunity to establish supporting amenities at stations, including:

- Refreshment outlets
- Retail outlets
- Services related to parked cars (washing bays), licence plates, etc.

Such facilities could attract all day activities to a station and could facilitate the self-surveillance of an area.

The issues of charging for station parking must be addressed as part of the city-wide parking pricing strategy that should be informed by the City's parking policy. The issue of whether parking should be free, charged for as part of the train ticket or charged for separately should be addressed. The TDM Strategy will be strengthened by providing free parking at stations to increase the financial benefit of using rail over paying for parking at the destination.

It is recommended that parking is only charged for once feeder services are established as an alternative means of reaching the station. This would influence the choice of mode for the trip to the station but should not jeopardize the attractiveness of using rail as the main mode of the journey.

Communications and marketing

Marketing plays an important role in changing perceptions of citizens, informing them of alternative travel options and increasing awareness of the benefits of more sustainable forms of transport. Thus marketing, awareness programmes and information forms an integral component of the TDM

Strategy. Marketing refers to communication about a product or service, where the purpose of this communication is to encourage the purchase or use a specific product or service.

In TDM, marketing will involve utilising various forms of communication or advertising media to influence travel behaviour and therein supporting the achievement of broader TDM objectives. The TDM marketing strategy should attract and persuade passengers to public transport, NMT or to other higher occupancy modes.

There are various reasons to market as part of the TDM Strategy, among others, it:

- allows the public sector to be creative and sell itself,
- offers public transport the opportunity to promote an image of high quality,
- enables the distribution of important pieces of information on TDM benefits and pilot programmes,
- enables the promotion of specific TDM programmes that the City chooses to encourage, and
- empower users to make informed travel decisions.

To date, the City has undertaken few marketing efforts around public transport promotion or encouraging a shift in travel behaviour. It is recognised that a successful TDM Strategy must include a comprehensive communication and marketing strategy.

Station selection and evaluation

A strategic station selection process was embarked upon to maximise the benefit of the first stage of the implementation phase. The factors considered in the selection and prioritisation process included the following:

- Distance from CBD: stations further from the CBD are preferred
- Optimized coverage: even spread of stations encouraged
- Densification corridors: parking not preferred at stations along these corridors
- IRT Network: no additional parking at stations to be served by IRT in short to medium term
- Metrorail express services: attractive parking encouraged at stations served by this service
- 2010 FIFA World Cup: Stations that will enhance the visitors' experience were preferred
- Retain existing users: Prefer stations where current demand is high to retain these users
- Road accessibility: Prefer stations with good accessibility to major road network to easily attract more car users
- Potential gain in passenger-kilometres: this factor takes into account the potential extent of a modal shift at a station given propensity for local community to be attractive by improvements in safety and convenience, with the estimated number of vehicle kilometres removed from the road network.
- Urban design potential: stations that can easily be integrated with surrounding land uses are preferred

It was decided that the quality of the rail service currently serving a station would not be considered as a definitive factor, as the rail service should be adaptive to respond to demand. Parking demand should not be curtailed by a low level of supply.

Priority stations

The ten stations that are currently being designed for implementation are listed in Table 2 below and shown in Figure 1 overleaf.



Figure 1: Priority Rail Park and Ride Stations

Name of Station
Kuilsriver
Brackenfell
Muizenberg
Retreat
Fish Hoek
Eerste River
Monte Vista
Kraaifontein
Plumstead
Ottery

Table 2: Priority Park and Rail stations

The Kuilsriver station was rated to have the highest priority of those selected for evaluation. It is situated more than 25 km from the Cape Town CBD, demand for parking exceeds the current capacity, it is not on a densification corridor and will not be served by the IRT network in the short to medium term. The station precinct further holds great potential for development and integration into the Kuilsriver CBD and residential areas on either side, and has good access from the arterial road network.

DISCUSSION AND CONCLUSION

Travel Demand Management is about changing the perception of people about the need to change their travel behaviour. The provision of capital projects for infrastructure and transport facilities are essential to building an attractive transport system. However, a transport system requires robust operational systems to ensure the day to day user needs are addressed.

Rail Park-and-Ride is about providing parking for cars in a human oriented, pedestrian friendly environment. Using high fences to secure cars impedes on the quality of the urban space, discouraging even more people from using it. However, if the station precinct can be developed into an attractive urban space, where other human activities are encouraged and facilitated, the safety of cars become a secondary function supported by general security improvements. This type of intervention moves away from capital intensive projects, to sustainable operational intensive systems.

For the Park-and-Ride project to be effective for longer than the initial period, when everything is new and clean, the operational management of the facilities has to be effective. Travel behaviour will not change overnight and car users will not flock to the rail system just because a station's parking has been upgraded. People will gradually make use of a facility if the formal and informal communication they receive convince them the improvements are permanent and will be lasting.

The potential benefit of the Park-and-Ride Strategy, if implemented successfully, is significant. The total estimated savings in vehicle kilometres is approximately 25 000 vehicle kilometres per working day, which amounts to almost 7 million vehicle kilometres per annum.

The ITP's objective for TDM states that "... *promotes a diversity of sustainable travel modes and practices that will influence the choices....*". *Sustainable travel modes* refer to capital spending on infrastructure and facilities, which is where intervention typically takes place. *Practices* refer to the operations of modes and management of facilities. Travel behaviour will only change once confidence is engendered in the transport system that is well

managed. It is therefore essential to ensure that the public transport facilities are managed in a proactive way.

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