

UNDERSTANDING THE UTILISATION OF PARK AND RIDE FACILITIES (CAPE TOWN - 2012)

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ABSTRACT

The City of Cape Town embarked on a policy that put “Public Transport First” relative to the trend in recent decades to prioritise transport planning for private car users. In doing so the City adopted a Travel Demand Management (TDM) strategy in 2006, which included the upgrading and extension of Park and Ride (P&R) facilities at Rail stations as one of the six key strategies for implementation. In preparation for the 2010 FIFA World Cup (FWC) held in Cape Town, a major project was rolled out to upgrade and expand a number of P&R facilities across the Metro. Early on in this project it was realised that the P&R upgrades would benefit more than just the car drivers originally targeted, and public transport vehicles as well as pedestrians and cyclists were accommodated in the upgraded areas.

This study set out to determine the extent of different feeder modes to Rail stations, or P&R facilities, as they are often referred to. It found that the numbers of people parking their car to catch commuter trains are relatively small compared to the total number of commuters accessing the rail system. This finding highlighted the inefficiency of spending funds for parking as a feeder mode and raises the need for a detailed assessment of actual commuter needs at each station before implementing a generic P&R solution.

1. INTRODUCTION

Heavy traffic congestion experienced by commuters travelling in and out of the Cape Town Central Business District (CBD), especially during the morning and the evening peak periods, has created a growing need for sustainable alternative transport solutions. In an effort to alleviate increasing congestion and polluting emissions, the City of Cape Town developed a TDM strategy with six core strategies to discourage car use and to encourage the use of public transport. The two strategies implemented to date are the “Upgrade of Rail Park and Ride (P&R) facilities” and an “Employer Trip Reduction” strategy.

“P&R facilities” are dedicated parking lots situated at commuter rail stations to provide conventional car commuters with a multi modal transport alternative when travelling into the CBD. The basic premise when upgrading the P&R facilities was that the provision of an adequate number of parking bays, set in a secure and adequately landscaped and well designed environment, would attract choice car users to shift their transport mode from car to rail.

1.1 Background and Motivation

In preparing for the 2010 FWC the City of Cape upgraded and expanded a number of P&R facilities along the Southern and Northern railway lines where the proportion of car

commuters were high. While actively marketing these, as well as some temporary facilities for the duration of the FWC, it was an initial intention to ensure that the use of the facilities would remain high, as a legacy to the marketing achieved during the soccer hype. It was observed that virtually no parking occurred at stations along the Central line where car ownership and usage levels are lower.

1.1.1 Travel Demand Management Strategy

The City of Cape Town's (CoCT's) main objective is to promote a diversity of sustainable travel modes and practises that will influence the choices made by commuters, in order to reduce the overall number of trips made by private vehicles, reduce emissions, minimise travel time and the optimisation of travel costs, especially during peak hour periods.

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

- Reduce the usage of single occupant vehicles,
- Promote and create an awareness of alternatives to private vehicle use and
- Change perceptions in the minds of the travelling public and that of businesses, that the private vehicle is not the only feasible alternative, and at the same time communicating the true cost impact of travel and the long term sustainability of the transport system.

Due to the need for land required for P&R facilities, as well as the desire to encourage the use of public transport services for an entire travel journey, the City's strategic view is that the need to drive to the facility would largely be replaced by feeder public transport services over time. It was believed that continually extending the parking areas would not be sustainable in the long run.

1.1.2 Sustainable Transport

Sustainable transport refers to an affordable, reliable, convenient and safe transportation system that can provide a diversity of options for commuters that will minimise pollution and significantly reduce the reliance on fossil fuels. This diverse and equitable transportation system will promote healthy, economical and environmentally sound solutions that make the best use of limited resources. A sustainable transport system could play an instrumental part in creating liveable cities. The concept of sustainable transport therefore hinges on the future viability of the individual transport alternatives. It also emphasises the economic and environmental factors that needs to be considered when implementing specific TDM strategies.

1.2 Aim of this paper

While this paper is based on the research paper for the attainment of the degree B Tech, titled: "Investigation into the Appropriateness of Park and Ride Facilities as a Sustainable Transport Alternative" (Wentley, 2012), it focuses specifically on the issue relating to the effectiveness of P&R facilities in influencing commuter travel behaviour.

2. RESEARCH METHODOLOGY

The research was initiated by reviewing literature on similar international studies in order to gain an understanding of the variables that was found to influence commuter travel behaviour. These research findings also assisted in the development of the initial survey spread sheet which was used during the pilot survey. The final survey data was then recorded and analysed in order to gain an understanding in the actual commuter travel behaviour at the selected Park and Ride commuter rail stations.

2.1 Literature review

Numerous studies have been conducted around the world on the effectiveness of P&R facilities in influencing commuters' travel behaviour. However, very little available and or recorded research could be found on the impact of these facilities in Cape Town and the greater South Africa. In reviewing the literature it was evident that the utilisation of P&R facilities was influenced by a number of inter related factors. Some of the more pertinent findings of international studies are detailed here;

- A study conducted by Paul Hamer in 2008 found that commuters living in outer metropolitan areas were more inclined to use public transport when commuting into the CBD than commuters living closer to the CBD. His study also found that an increase in the capacity of P&R facilities did not directly influence the demand for parking at these facilities.
- Researchers in the transport department of the Polytechnic University of Madrid (Monzon, *et al*, 1997) found that by meeting the "softer" needs of the commuters as regards security, speed, ease of availability, flexibility, frequency and comfort, service providers are able to convince commuters using private vehicles to switch to a multi-modal transport alternative or to using only public transport to travel to and from work.
- The bus based P&R scheme in Cambridge was studied by Smith (2000) in order to establish the sustainability of the P&R facilities. He found that although there was a definite demand for these facilities, the amount spent by government at the expense of investment in supplementary feeder services was excessive.
- A study conducted at three P&R stations in Cape Town before and after the 2010 FWC by Van Rensburg (2011), indicated that the reasons for changes in commuter travel behaviour was not as a result of the provision of additional parking bays, but rather motivated by finances, changes in jobs, moving house and the provision of security at the stations.
- A study conducted in South Wales by Speyer *et al* (1996) found that various demographic characteristics of the urban area surrounding the Public Transport Interchange affect commuter travel behaviour. Commuters living in lower socio economic areas were found to be more inclined to use public transport or even walk to the station.
- The three case studies conducted by Winthorp (2010) based on P&R facilities in Canada and Australia revealed that the supply and demand management of the feeder bus services and P&R facilities can work together to create a well-balanced, integrated, sustainable public transport network.

The literature revealed that, while there is a definite demand for parking facilities at commuter bus or rail stations, it is not necessarily the most affordable or the only alternative that should be invested in.

On the back of this literature review we will now aim to establish if the capital expenditure, as laid out by the CoCT matches the needs of the commuters, and is therefore justified when compared to the actual travel patterns of the commuter volumes.

2.2 Survey based data collection

Five commuter rail stations were selected along the Northern rail line in the Northern and Eastern areas of Cape Town as depicted in Figure 1. Parking at four of the stations, being Monte Vista, Kuilsriver, Brackenfell and Kraaifontein, was upgraded prior to the 2010 FWC, while the fifth, Eersteriver, will be upgraded during 2013.

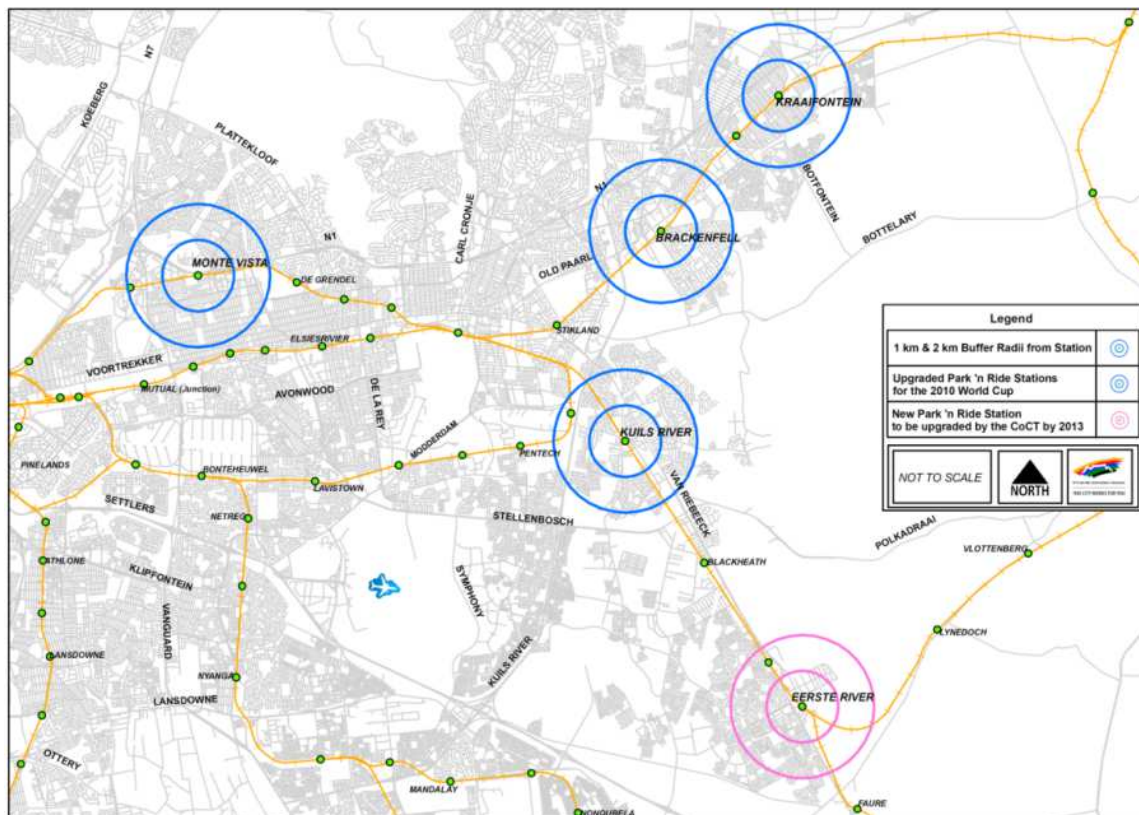


Figure1: Locality of the five P&R rail stations

The research was based on a survey during the AM peak period. The peak period was found to range between 05h00 and 09h00, with the peak starting earlier as the distance from the Cape Town CBD increases. Each selected station was surveyed for a period of Five days. The survey team members were strategically positioned at each station at the various points of entry as depicted in Figure 2 for Kuilsriver station, in order to ensure all vehicles and all commuters entering the station precinct were counted.



Figure 2: Survey observation points at Kuilsriver upgraded P&R station

The survey was conducted by counting the number of people as well as their mode of transport when entering the Public Transport Interchange (PTI). In addition, the number of vehicles using the P&R facility during the AM peak period was also counted. The transport alternatives used by commuters when travelling to the stations included walking and cycling, referred to as non-motorised transport (NMT); public transport, which includes both minibus taxis (MBTs) and buses; private vehicle drop offs referred to as “Kiss and Ride” (K&R); and private vehicles parking at the station, or the traditional core of the P&R facilities.

3. DISCUSSION OF RESULTS

The results of the full survey of the five stations, surveyed for five days each, is summarised in Table 1. The table shows the average number and percentage of commuters arriving per day, by each of the identified feeder modes.

For purposes of this data analysis the five stations have been rated according to population density and the socio-economic profile in the area surrounding the relevant station. Monte Vista being the lowest population density and on average the highest socio-economic profile was categorised as 1 compared to Kraaifontein that has the highest population density and comparatively the lowest socio-economic profile was categorised as 5. In addition, the distance between the CBD and each station is included.

3.1 Commuter Travel Behaviour

Table 1: Survey data – Commuter travel behaviour

Detail	Monte Vista		Brackenfell		Kuilsriver		Eersteriver		Kraaifontein		Total	
Distance from CBD	10 – 15 km		20 – 25 km		25 – 30 km		> 30 km		25 – 30 km		-	
Socio economic rating	1		2		3		4		5		-	
Average daily commuter feeder usage												
Walking	192	46%	1491	72%	3105	55%	3040	53%	6204	89%	14031	67%
Kiss and Ride	84	20%	290	14%	578	10%	317	5%	386	6%	1656	8%
Cycle and motor bike	0	0%	2	0%	12	0%	12	0%	8	0%	34	0%
Park and Ride	144	34%	270	13%	470	8%	155	3%	96	1%	1134	5%
Public transport	0	0%	5	0%	1444	26%	2241	39%	280	4%	3970	19%
Total	420	100%	2059	100%	5608	100%	5765	100%	6974	100%	20826	100%

The number of commuters entering the public transport interchange increased as the distance from the CBD increased. The increase in commuter numbers further corresponds directly with the decrease in the socio-economic conditions of the area surrounding the station. Monte Vista station, being the closest to the CBD, only had an average of 420 commuters entering the PTI, compared to Kraaifontein, being the second furthest station, with an average of 6,974 commuters entering the station during the AM peak period. While both Kraaifontein and Eersteriver lie within lower income areas, the Wallacedene community feeding the Kraaifontein station is notably poorer than the community feeding the Eersteriver station.

While at all five stations the majority of commuters walk to the station in the morning, more people arrive by car (i.e. K&R and P&R) at Monte Vista station. The average daily number of commuters using these five stations in the mornings is 20,826, of which 67%, or 14,031 people, are walking to the station. It was not the aim of this study to test for a correlation between the distance people walk and the socio-economic profile of the communities. Figure 3 is presented to graphically highlight this finding.

The most notable statistic however, is that in Kraaifontein, which is a densely populated low income socio-economic area, it was found that approximately 6,204 people walk to the station in the early hours of the morning, starting to peak from about 05h00 to 07h00. During the same time, fewer than 500 cars brought passengers to the station, of which only 96 cars were parked. Ironically, the P&R upgrade project focused on providing a much improved parking area with attractive landscaping, while no improvements were made to the pathway for the vast majority of commuters. This while the pathway is inadequately designed for the pedestrian volume and not well lit. The low number of only 280 people that used public transport to travel to Kraaifontein station highlights the low socio-economic conditions where commuters are unlikely to afford the additional transport costs.

As the vision of Cape Town’s public transport system is to provide a “safe, effective, efficient, equitable and affordable public transport system”, the provision of basic NMT infrastructure should be a higher priority at stations like Kraaifontein.

3.2 Use of public transport

The second most popular feeder mode across the stations surveyed is public transport, which includes busses and mini bus taxis. The higher volume of commuters using public transport at Kuilsriver and Eersteriver is attributed to the formal minibus taxi facility

immediately adjacent to these two stations. As can be seen in Figure 3 below 19%, or 3,970 of the commuters surveyed across the five stations used feeder bus and minibus taxi services.

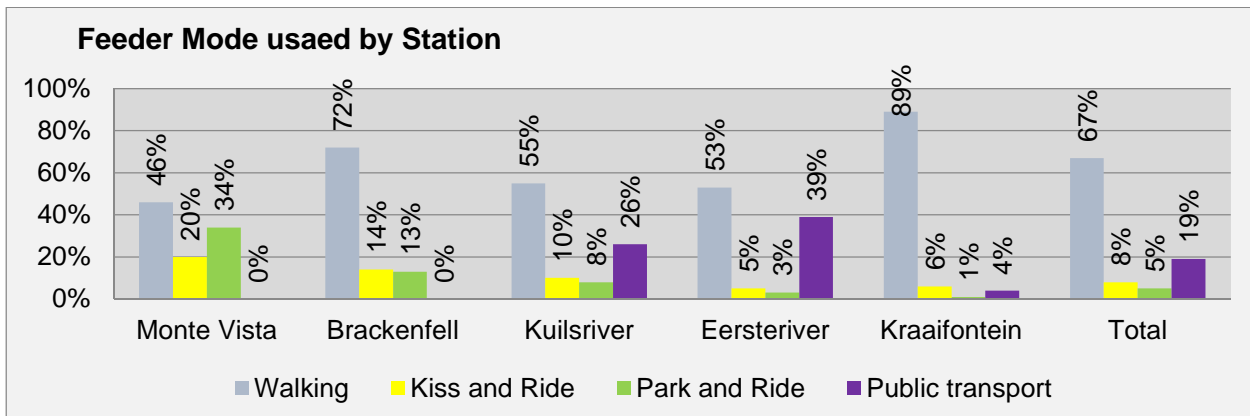


Figure 3: Survey data – Commuter revealed feeder choice

Monte Vista station does not have any public transport services for commuters to use. Although commuters travelling to Brackenfell and Kraaifontein have access to public transport feeder services, the number of people making use of these services are very low, being 0% and 4% respectively. Kuilsriver and Eersteriver stations have large volumes of commuters using the public transport feeder services, being 26% and 39% respectively.

Both Kuilsriver and Eersteriver station have bus/minibus taxi ranks within the station precinct, which appears to have a direct correlation with the volume of commuters entering the station via public transport feeders. The low commuter volumes entering Brackenfell and Kraaifontein station via buses/minibus taxi's reinforces this conclusion since these stations does not have bus/minibus taxi ranks included in the station precinct.

While walking and cycling is arguably the preferred feeder mode, the travel time to stations should not be excessive. This confirms the need to test the distances people walk in order to assess the possible need for subsidised and scheduled feeder public transport services.

3.3 Capacity utilisation of the Park and Ride facilities

Of the average of 20,826 commuters entering the five stations surveyed on a daily basis, only 1,134 uses the P&R facilities, amounting to only 5% of the population surveyed.

Brackenfell and Kraaifontein stations are along the same railway line and are approximately 5 km apart, but Kraaifontein station is in a much lower socio economic suburb than Brackenfell station. While the number of people arriving at the Kraaifontein station is more than three times that of Brackenfell, only 1% of the commuters at Kraaifontein station use the P&R facilities, compared to 13% at Brackenfell station.

In contrast with the literature findings, the number of commuters using the P&R facilities as a percentage of the total number of users entering the selected PTI during the AM peak period decreased significantly as the distance from the CBD increased. 34% of the commuters using Monte Vista station made use of the P&R facilities compared to 8% in Kuilsriver and only 1% in Kraaifontein. This could be interpreted to confirm the South African spatial imbalance, where poorer community is situated further from main economic activities, while higher income communities can afford the higher priced properties closer to the CBD.

The four stations that were upgraded before the 2010 FWC included an additional 145 parking bays added to Kuilsriver station and 100 bays added to Brackenfell station. Parking bays at Monte Vista and Kraaifontein were reconfigured and improved using landscaping and improved lighting. The upgrades include increasing parking capacity where deemed necessary and where land is available to do so, improvements to existing parking facilities, improved NMT infrastructure in the station precinct, bicycle parking facilities and general civil works in the station precinct.

While the focus was on upgrading the parking spaces, meaningful improvements were made for pedestrians and cyclists at Kuilsriver, Monte Vista and Brackenfell stations. However, given the minority role of this mode, even when trying to attract new users to rail, any future designs must ensure that the upgrade of such facilities prioritise the major feeder modes. Table 2 shows the extension to the number of parking bays as well as the utilisation at these stations, while Figure 5 illustrates the utilisation of each station.

Table 2: Park and ride facilities – Capacity utilisation analysis

Station	Monte Vista	Bracken fell	Kuils river	Eerste River	Kraai fontein	Total
Parking bays available before upgrade	235	355	182	100	210	1082
Additional bays added	0	100	145	0	0	245
Parking bays available	235	455	327	100	210	1327
Parking bays used during AM peak period	123	263	389	118	80	972
Excess capacity or (shortfall)	113	192	-62	-18	130	355
Parking capacity utilisation	52%	58%	119%	118%	38%	73%

Figure 4 indicates that the utilisation of the parking facilities at the five stations surveyed range from 38% to 119%, with formal bays being filled and additional parking occurring on gravel strips and along surrounding streets.

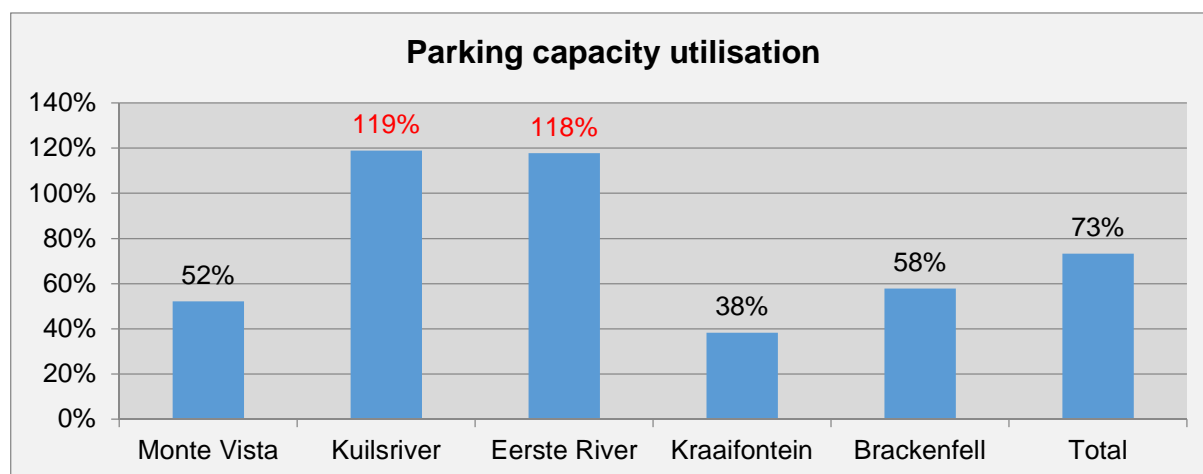


Figure 4 Survey data – Parking capacity utilisation

During the survey period it was noted that security services are only provided at Kuilsriver and Eersteriver stations. This is due to the fact the these stations precincts include bus and mini bus taxi ranks and the City of Cape Town is therefore mandated to provide security. A direct link was noted between security services and parking capacity utilisation. Both Kuilsriver and Eersteriver stations has vehicles parking illegally by 09h00 due to the demand far exceeding the limited availability of parking bays.

The additional 100 bays added to Brackenfell station was not utilised by 09h00. The upgrades implemented at Monte Vista, Brackenfell and Kraaifontein does not appear to have encouraged many new users to travel to the station with their private vehicles, since these facilities have significant reserve capacity at the end of the AM peak period. This could place a question mark on the appropriateness of government spending on upgrading P&R facilities, when the vast majority of commuters are walking to the station.

4. CONCLUSION AND RECOMENDATIONS

The provision of a “safe, effective, efficient, equitable and affordable public transport system” is not achieved when looking at the large volumes of commuters walking to the respective station. The lack of basic NMT infrastructure should be a higher priority. The NMT infrastructural developments should include initiatives such as lighted pathways from within the residential areas leading to the station as well as CCTV cameras or visible security patrolling the commuter walkways during the peak period.

The results have highlighted a link between the provision of security and the capacity utilisation of the P&R facilities. In order to encourage commuters at stations such as Brackenfell, Monte Vista and Kraaifontein to use the upgraded P&R facilities the CoCT should look to providing security at all these stations. A further study could be done in order to establish the reasons why the P&R facilities at selected stations are not being utilised to its maximum capacity as at Kuilsriver and at Eersteriver.

It is evident that the most appropriate mode of transport for commuters cannot be determined generically as it is influenced by a number of environmental and economic conditions specific to the station and the community under review. Each station has its own dynamics which is based on the specific commuter needs, the socio economic conditions of the surrounding residential areas, the actual location of the station with reference to the residential area and the public transport routes, the distance of the station from CBD and the availability of an affordable feeder service to the commuter rail station. Therefore a standard solution is not feasible for all stations but the individual needs of the respective stations must be evaluated in order to ensure that the expenditure incurred in upgrading the facilities is in line with the commuter needs and the TDM strategy of the CoCT.

It should be established whether it is financial circumstances of commuters in lower socio-economic areas like Kraaifontein, that prevent more people from using public transport feeder services, or whether the walking distance does not add significantly to the total travel time. This information would confirm the need to provide subsidised feeder services to reduce the travel time. The P&R strategy could be adapted to include for the provision of operational subsidies for feeder services in lieu of capital spend on parking upgrades.

Another consideration raised in the literature review, and which requires further analysis in Cape Town, is the opportunity cost of land. By developing P&R facilities on the limited available land around the stations, the opportunity for both bus and mini bus taxi ranks as well as commercial or residential development, is restricted.

Parking policy aims to encourage alternative modes to destination but causes diversion of private vehicle congestion to the upgraded parking area. The P&R strategy should be looked at holistically with reference to the impact on the traffic congestion and the capacity of the roads leading to the station.

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