PUBLIC TRANSPORT FARES RATIONALISATION FOR CAPE TOWN

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THE NEED FOR FARE RESTRUCTURING IN SOUTH AFRICAN CITIES

The current pattern for fare setting across all public transport services in the Cape and throughout most urban areas of South Africa, is very closely related to distance travelled, i.e. all modes apply distance-based fare systems**.** This is a relatively common basis for fare setting in public transport and is not necessarily a poor method. In the local situation, however, there is no mechanism which links actual operating cost with the fares charged. The authorities responsible for public transport service delivery critically need to understand the cost of provision to determine fare charged, so that it can evaluate and recommend the allocation of subsidy to appropriate services and set equitable fares with a good understanding of how much it is costing to offer the service.

Secondly there are wide discrepancies between fares of different modes and the service they offered, which may not be promoting the most economically efficient passenger trip strategies. The consequence is often a misallocation of subsidy, i.e. subsidy that is not properly targeted to assist the least able to pay to access basic services and instead is used for supporting often ineffective service operations. For example, subsidy is often provided to two operators that are effectively in direct competition with each other. Also there is a misdirection of scarce funds into service operations which are supporting dispersed networks defeating the aim of channeling resources into a more effective consolidated public transport system.

OBJECTIVES FOR FARE POLICY DEVELOPMENT

A general framework for setting public transport fares is to maintain a correlation to the cost of service provision whilst using fares as an instrument to effect key policy objectives, such as;

- Providing affordable basic access,
- Supporting key corridors of primary movement, and
- Addressing strategic transport issues, for example limiting private transport growth.

From the passengers' perspective, fares policy and pricing must be easily understood and transparent. Basically, the simpler the system is, the better the promotion of public transport. Zonal based fare systems are easily communicated and quickly understood by customers**.** Fare zones also make it easy to target specific local areas (for example, concessionary fares for low income populations).

As an instrument, fares policy can effect a degree of change in trip strategies. For example, by encouraging commuters towards more efficient routes and along corridors of primary movement, by targeting these services at a lower cost. The choice passengers maintain the opportunity to pay a premium for a route option that doesn't contribute to the primary network but may offer preferred time and quality attributes. In this example fares policy is therefore working to support efficient services.

But fares policy alone is not able to radically alter the system of provision, nor cannot it be relied upon to effect radical strategy changes. Fares rationalisation is not going to change the network structure, but only to demand response to services that are currently provided. National policy now recognizes the importance of undertaking public transport network and service revision, and this is a statutory objective. Hence in the development of fares policy, the transitional process of working towards improved public transport systems must be understood, and that therefore both short and long-term fare restructuring aims must be established.

Network restructuring objectives will lead over time to inter-modal integration initiatives. Without integrated ticketing, physical integration will be less successful. A zonal system will provide the appropriate basis for integrated ticketing initiatives. Experience of trends internationally indicates that for most major metropolitan areas, an easy to understand integrated fare zone system is the preferred fare system.

The basic framework for local fares policy aims relies on the following aspects:

- Provide services at minimum cost against agreed quality of service, thus passing on the minimum cost for the passenger
- Only the cheapest mode meeting all the required safety and service criteria will be recognized as being eligible for any financial support in terms of fare relief for the passenger
- Fares will be set with a full understanding of the cost of service provision: with respect to the variable operating and fixed costs, and the relationship to trip generation. Peak and off-peak charging will be introduced wherever feasible

For the development of effective fares policy by any transport authority, the following information is a key pre-requisite:

- The cost of current service provision (as well as alternative options) – operational and economic (accidents etc)
- How the public transport structure will change in the future
- Current gap between cost and revenue on a localized basis
- Ability to pay for services / areas needing special assistance
- Areas which are highly sensitive to price changes from a point of view of switching modes (public to private).

SCOPE OF THE CAPE TOWN STUDY

The Cape Town fares project illustrates a possible planning approach to public transport fares rationalization needs within the current institutional context i.e. of currently non- integrated services with a lack of local institutional and operational control, and the movement towards network restructuring and institutional reform. Embarking on fares rationalization within this context involves establishing what improvements can be made short-term which can affect immediate efficiency gains and "pave the way" for integrated fares policy and longer-term gains.

This study is concerned with the investigation and specification of the appropriate steps to develop an improved fare system for Cape Metropolitan Area public transport services. The guiding framework can be briefly documented via the following points, and the structure of investigation and analysis is highlighted in Figure 1:

1) The study took as its starting point the recommendations of earlier work undertaken for CMC on Fares Rationalisation. The main recommendation was for a zonal fare system to be introduced, which would perform better than a distance based or flat fare structure on the following key basis:
   (i) x
   (ii) y
   (iii) z

2) Investigation and development of an appropriate zonal system for Cape Town public transport network.

3) Recommended steps to aid rapid introduction of the zonal fare system in the short term.

4) Development of long-term fare structures which is logical and consistent in terms of the cost of service provision as well as being flexible to incorporate other economic and equity issues, such as local area affordability.

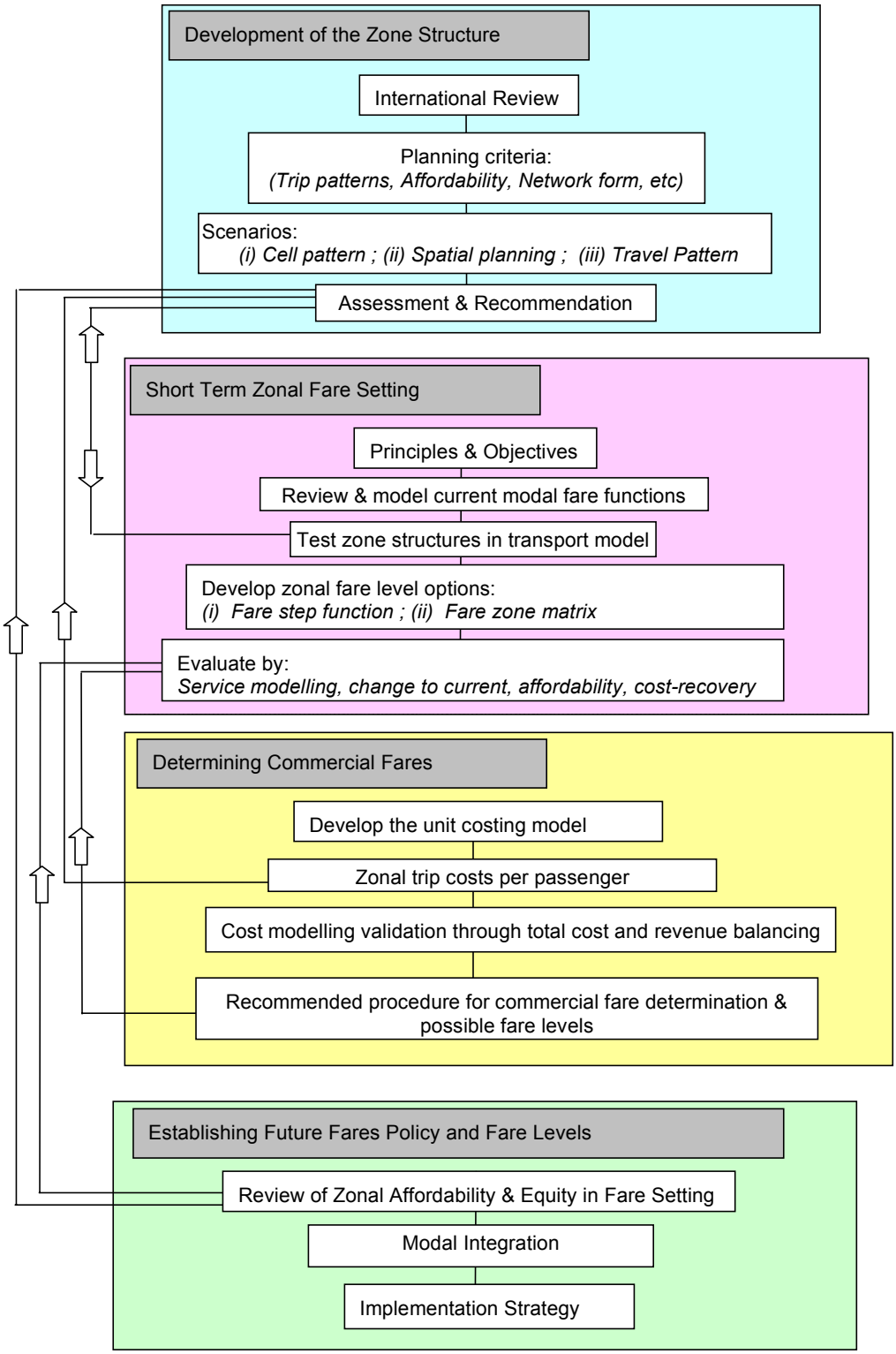
5) Prepare a practical implementation programme to guide and facilitate the implementation of the differentiated zone based fare system

INVESTIGATION AND DEVELOPMENT OF AN APPROPRIATE ZONAL SYSTEM FOR CAPE TOWN PUBLIC TRANSPORT NETWORK.

Various transport fare zone scenarios were developed and refined further through delimitation by local area homogeneity in land type and socio-economic make up. This formed the basis for constructing differentiated zone based fare system alternatives. Following this, fare zone structure and zone boundaries were proposed for the Cape Metropolitan Area. Structures varying from coarse to fine were reviewed. The recommended zone structure is indicated as Figure 2. The structure takes account of the following key additional aspects:

- Travel patterns and transport networks – main movement corridors
- Affordability – larger zones in the poorer areas (travel further between fare stage increase)
- Premium for entering central area.
- International comparisons to determine optimum number of zones

Figure 1. **Fare Rationalisation Study : Structure of Investigation and Analysis**



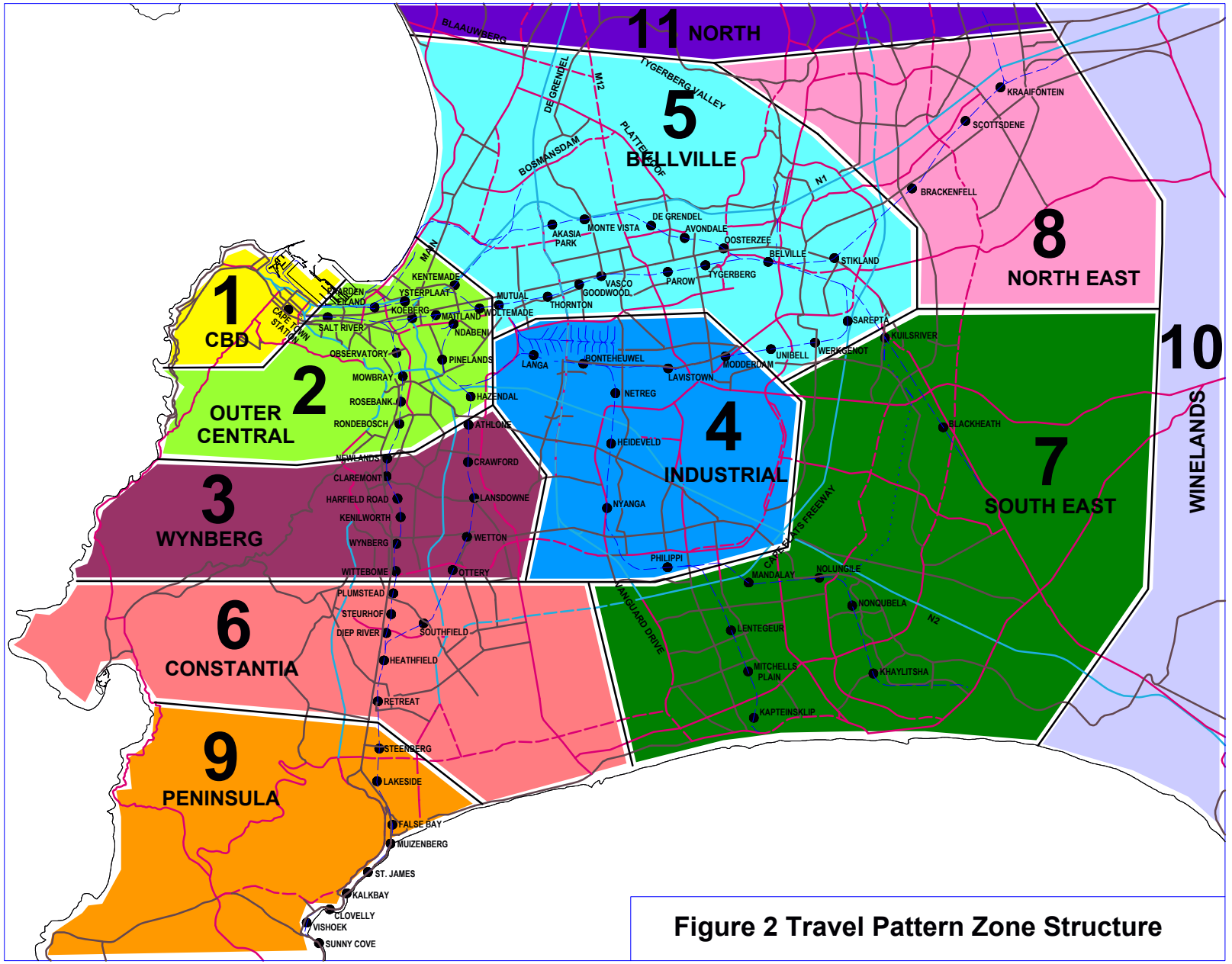


Figure 2 Travel Pattern Zone Structure

INTRODUCTION OF THE ZONAL FARE SYSTEM IN THE SHORT TERM

To aid a rapid introduction of the zone structure the current fares for bus, rail and taxi were converted from existing levels (which approximate to distance based fares) to zonal fares. This would enable a transition to a zonal system without significant shifts in demand patterns. The zonal structure, shown as Figure 2, was developed with the aim of addressing some cost recovery, affordability and equity issues even in the short term.

The recommended short term zone fare structure, shown in Table 1, is based on an equal fare step for every zone passed, would result in higher fares for some areas compared to the present (see Table 2).

Table 1 : Zonal trip fares for number of zones required

	Number of Zone Boundary Crossings							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Rail	1.25	1.25	1.90	2.30	2.30	2.30	2.30	2.30
Bus	2.40	3.00	3.60	4.60	5.60	6.60	6.90	6.90
Taxi	1.50	2.80	4.00	5.00	6.00	9.00	9.00	9.00

Table 2 : Rail fares, possible short-term change (on a zonal system)

	CBD									
CBD	*	O.CENTRAL								
OUTER CENTRAL	1.25	1.25	WYNBERG							
WYNBERG	1.90 (52%)	1.25	1.25	INDUST.						
INDUSTRIAL	1.90 (52%)	1.25	1.9	1.25	BELLVILLE					
BELLVILLE	1.90 (52%)	1.25	1.9	1.25	1.25	CONST				
CONSTANTIA	2.30 (84%)	1.90 (52%)	1.25	2.30 (21%)	2.3	1.25	S. E.			
SOUTH EAST	2.30 (21%)	1.9	2.3	1.25	1.9	2.3	1.25	N. E.		
NORTH EAST	2.3 (21%)	1.9	2.3	1.9	1.25	2.3	2.3	1.25	PEN.	
PENINSULA	2.30 (21%)	2.30 (21%)	1.90 (52%)	2.3	2.3	1.25	2.3	2.3	1.25	WINE.
NORTH	*	*	*	*	*	*	*	*	*	*
WINELANDS	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	1.25

From Table 1, the difference between Metro class rail fares and bus fares can be clearly seen. Bus fares being at least double the cheapest rail fare available. Also apparent is the competitive niche of the minibus taxi for short journeys.

Converting to a zonal fares system with equal fare steps between zones, would have an impact of raising the typical fares for some rail journeys, as outlined in Table 2. Rail fares from the Southern Suburbs to the CBD would be increased, which could be a policy goal – given the high average affordability and current low cost coverage, discussed below.

DEVELOPMENT OF LONG TERM FARE STRUCTURES

The emphasis was to develop a basis for setting future fares that could represent the foundation of future fare policy for the Cape metropolitan transport area. Two key aspects were analysed:

(i). Cost of service provision and,
(ii).Passenger affordability of fares.

Unit Costing Model

A cost model was developed to approximate the unit costs per trip between any two zones. A matrix of fares is presented in Table 3 that, on the basis of the unit costs (accounting for anomalies), outlines the fares levels that would generate full cost recovery across the network for bus and rail services. Because of the general low level of cost recovery from operations currently (shown in Table 4) most fares would increase substantially if a cost recovery objective were pursued.

Table 3a : Commercial Rail Fare (Rand per single journey)

			Destination Zone										
			1	2	3	4	5	6	7	8	9	10	11
			CBD	O/Cent	Wyn.	Industria	Bell.	Const.	S.E.	N.E	Peninsula	Winel'nd	North
Origin Zone	1	CBD	0	2	3	2	4	4	3	5	5	7	*
	2	Outer Centre	2	2	2	2	4	3	3	5	5	7	*
	3	Wynberg	3	2	2	3	4	2	3	4	4	6	*
	4	Industrial	2	2	3	2	3	4	2	3	4	2	*
	5	Bellville	4	4	4	3	2	5	3	4	5	4	*
	6	Constantia	4	3	2	4	5	2	3	5	3	7	*
	7	South East	3	3	3	2	3	3	2	3	3	3	*
	8	North East	5	5	4	3	4	5	3	2	5	3	*
	9	Peninsula	5	5	4	4	5	3	3	5	2	7	*
	10	Winelands	7	7	6	6	4	7	3	3	7	*	*
	11	North	*	*	*	*	*	*	*	*	*	*	*

Table 3b : Commercial Bus Fare (Rand per single journey)

			Destination Zone										
			1	2	3	4	5	6	7	8	9	10	11
			CBD	O/Cent	Wyn.	Industria	Bell.	Const.	S.E.	N.E	Peninsula	Winel'nd	North
Origin Zone	1	CBD	3	4	6	9	9	8	11	11	10	15	15
	2	Outer Centre	4	3	4	6	7	7	10	10	8	15	15
	3	Wynberg	6	4	3	6	8	2	9	10	6	14	16
	4	Industrial	9	6	6	3	5	8	6	9	10	13	15
	5	Bellville	9	7	8	5	3	9	6	6	11	12	13
	6	Constantia	8	7	2	8	9	3	8	13	4	14	17
	7	South East	11	10	9	6	6	8	3	8	9	9	16
	8	North East	11	10	10	9	6	13	8	3	13	7	11
	9	Peninsula	10	8	6	10	11	4	9	13	3	16	18
	10	Winelands	15	15	14	13	12	14	9	7	16	*	*
	11	North	15	15	16	15	13	17	16	11	18	*	*

Table 4 : Cost Recovery of Current Fares (Operating costs only)

RAIL

	CBD	OUTER CENT.	WYNBERG	INDUSTRIAL	BELLVILLE	CONSTANTIA	S. EAST	N. EAST	PENINSULA	WINELANDS	NORTH
CBD	*	0.63	0.63	0.63	0.45	0.50	0.76	0.38	0.51	0.46	*
OUTER CENT.	0.63	0.83	0.83	0.83	0.71	0.63	0.95	0.38	0.54	0.46	*
WYNBERG	0.38	0.71	0.83	0.76	0.63	0.83	0.92	0.66	0.50	0.66	*
INDUSTRIAL	0.63	0.83	0.95	0.83	0.83	0.76	0.71	0.63	0.66	0.77	*
BELLVILLE	0.26	0.33	0.48	0.45	0.50	0.58	0.69	0.33	0.51	0.51	*
CONSTANTIA	0.29	0.45	0.83	0.48	0.61	0.63	0.71	0.46	0.63	0.46	*
S. EAST	0.76	0.84	0.84	0.71	0.95	0.84	0.83	0.92	0.84	1.00	*
N. EAST	0.29	0.35	0.46	0.42	0.29	0.38	0.77	0.42	0.38	0.32	*
PENINSULA	0.29	0.38	0.31	0.51	0.44	0.36	0.48	0.44	0.50	0.44	*
WINELANDS	0.35	0.42	0.46	0.51	0.45	0.38	0.83	0.38	0.38	0.21	*
NORTH	*	*	*	*	*	*	*	*	*	*	*

0 - 0.4
0.4 - 0.65
0.65 - 0.8
0.8 +

BUS

	CBD	OUTER CENT.	WYNBERG	INDUSTRIAL	BELLVILLE	CONSTANTIA	S. EAST	N. EAST	PENINSULA	WINELANDS	NORTH
CBD	0.60	0.47	0.44	0.39	0.33	0.42	0.38	0.24	0.34	0.26	0.37
OUTER CENT.	0.47	0.48	0.51	0.40	0.35	0.39	0.35	0.23	0.34	0.24	0.33
WYNBERG	0.44	0.51	0.48	0.44	0.35	0.43	0.35	0.27	0.32	0.24	0.37
INDUSTRIAL	0.39	0.40	0.44	0.48	0.37	0.37	0.37	0.27	0.40	0.28	0.33
BELLVILLE	0.33	0.35	0.35	0.37	0.40	0.40	0.44	0.25	0.34	0.25	0.28
CONSTANTIA	0.42	0.39	0.43	0.46	0.40	0.44	0.58	0.34	0.35	0.26	0.37
S. EAST	0.30	0.39	0.39	0.37	0.35	0.31	0.60	0.29	0.35	0.40	0.37
N. EAST	0.24	0.23	0.27	0.27	0.25	0.30	0.29	0.30	0.30	0.28	0.27
PENINSULA	0.34	0.34	0.32	0.40	0.34	0.35	0.35	0.30	0.40	0.30	0.36
WINELANDS	0.26	0.24	0.24	0.23	0.25	0.26	0.40	0.28	0.30	0.30	0.24
NORTH	0.37	0.33	0.37	0.33	0.28	0.37	0.37	0.27	0.36	0.24	0.34

0 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 +

Adjusting fares radically to become more closely aligned to the cost of provision only really becomes feasible once restructuring of the local public transport networks has really taken shape for the following reasons:

- Huge changes would result in the pattern of demand following the fare increases, with far fewer people traveling and trip strategies changing.
- Calculated costs can be drastically cut through efficiency drives at the individual route and service level and through network restructuring.

Fare Affordability

Turning to the issues of equity and affordability, Table 5 indicates the income levels of commuters in each zone. At the disaggregate level such information can be used to estimate the degree of financial support specific zones require for transport fares to perform in line with policy on basic access needs and affordability.

Table 5: Income level and Affordability by Zone

		% of Commuters, by income			Affordability Factor	Variation from Average affordability
	Fare Zone No.	Low	Medium	High		
1	CBD	29%	57%	14%	37.0	1.46
2	Outer Centre	39%	53%	7%	31.1	1.23
3	Wynberg	30%	55%	15%	37.0	1.47
4	Industrial	62%	36%	2%	22.2	0.88
5	Bellville	36%	52%	12%	33.9	1.34
6	Constantia	41%	51%	8%	31.1	1.23
7	South East	62%	36%	2%	22.2	0.88
8	North West	33%	55%	12%	34.7	1.37
9	Peninsula	44%	50%	6%	29.0	1.15
10	Winelands	47%	46%	7%	28.7	1.14
11	North	37%	56%	6%	31.3	1.24

Note that in all zones there is a significant percentage of low-income commuters. A policy of setting higher fares in specific zones with a higher average affordability will still require detailed review and analysis to avoid significant negative impacts on the low-income zone inhabitants unless public transport service alternatives are available.

The longer-term fares policy work must use the information of unit costs, equity as well as the overarching social objectives for affordable access to develop the detailed framework for setting fares. Clearly the opportunities for revenue enhancement must be reviewed in association with expected behavioural responses (using for example stated preference modelling).

Integrated Fares

Due to the fact that few services are scheduled and designed to integrate with other modes and transport services, the ability to introduce integrated fares and effect proper revenue allocation is certainly, for widescale application anyway, an issue for longer term implementation. In the design of integrated fares, the price mechanism should encourage passengers to always choose the mode which has the lowest operating cost for each leg of the journey hence assisting in improving the overall efficiency of the public transport system.

IMPLEMENTATION PROGRAMME

A practical implementation programme must be developed to guide and facilitate the implementation of the differentiated zone based fare system in appropriate phases and stages. The implementation programme consists of the following:

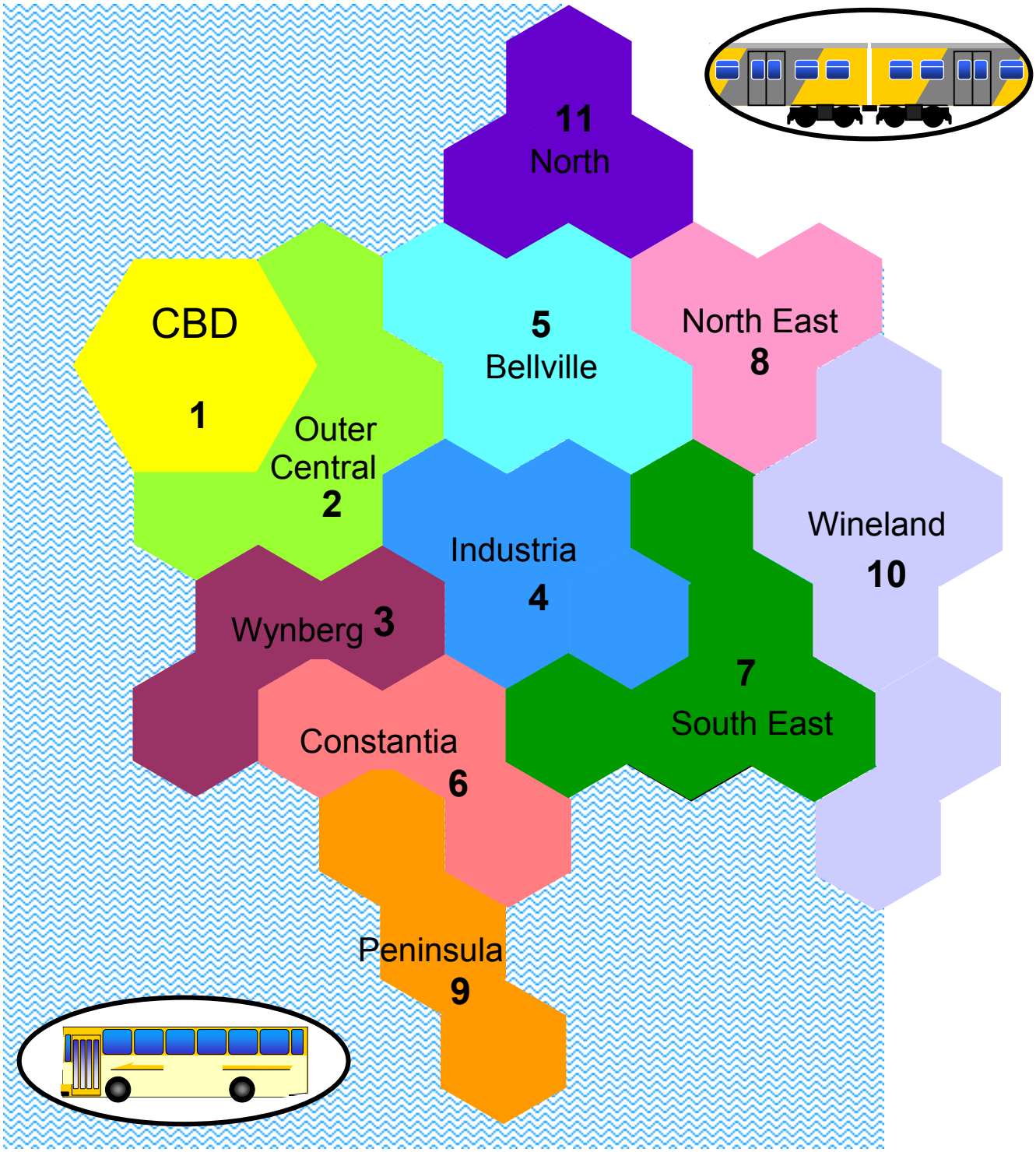
- A long-term fare system, including fare structure and levels for each mode, as well as the fare zone boundaries.
- A time scale for the introduction of the long-term fare system. The time scale takes account of the legal and organisational constraints in fare adjustments, as well as the possible destabilisation of the public transport market through rapid fare adjustments over the short term.
- A practical plan outlining the procedure through which fare adjustments can be made for rail, bus and minibus-taxi.
- Integration of the proposed fare system with the current and proposed future ticket system. This aspect can only be covered comprehensively as part of the preferred ticket system analysis.
- A monitoring procedure to determine the success of the implementation, and to facilitate further adjustments to the fare level

CONCLUSION

The Cape Town case study provides an example of how current system analysis can help to develop the main objectives of local area fare policy.

A series of information needs and analysis tasks have been identified and key requirements listed. A staged approach to implementing fares system policy changes is highly recommended. Implementation of the zoning system and adjusting fares in line with the recommended short-term strategy is now being pursued by the local authority.

Figure 3: Simplified Travel Pattern Zone Structure



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- Passenger Information System for Public Transport in Cape Town, 2001 (current)
- Strategic Assessment of Dar es Salaam's Public Transport Network, 2001 (current)
- Public Transport Fares Rationalisation for Cape Town, 2000
- Network modelling for the restructuring of GPMC bus services, 1999
- Development of the PTSM model to aid the restructuring of public transport networks in SA, January 2000
- Tactical Rationalisation of Bus Services in the GPMC area, July 1999
- FIFA 2006 World Cup Bid: Transport Technical Report for South Africa 2006, July 1999
- Current Public Transport Record of Bus Services in the GPMC, June 1999

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