

URBAN NODES AND CORRIDORS

The role of public transport in urban Cape Town: The case of Klipfontein Corridor

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Abstract

The debate on the provision of efficient public transport in Cape Town and South Africa is an urban myth. Recent media reports (*Business Day*, 28 November 2005; *Cape Times*, 30 November 2005) cite the South African leadership as reiterating the importance of investing in public transport, infrastructure and maintenance, among others, to reach targeted economic growth rates of 6%.

Cities across the developed and developing world have invested in public transport infrastructure and systems that have not only had successful economic spin-offs but also substantially increased the public's access to wider urban opportunities [1]. In South Africa, we can only hope that one day a good public transport system will happen against the syndrome of 'much talk and no action'.

In anticipation of this hope, the paper intends to explore the potentials associated with the relationship between investment in public transport and urban development focusing on urban nodes and corridors as opportunities for intervention that can also contribute to city restructuring. It examines the possibilities of public transport infrastructure to contribute to urban development that begins to promote positive urban living environments reinforced by thresholds, appropriate densities and urban form. It will also investigate the economic opportunities that can begin to emerge as a result of appropriate urban and transportation planning and design.

The paper focuses on the nature of the public transport investment, the associated urban spatial and social elements and economic opportunities drawing lessons for the Klipfontein Corridor [2] in Cape Town from Bogotá and Curitiba in South America where bold investment programmes in public transport infrastructure have been pursued. The paper addresses whether improved public transport can lead to increased economic growth as well as access to urban opportunities for the public at large.

Introduction

How and in what form do we begin to address and invest in public transport infrastructure to ensure that such investment not only responds to the need for improved public transport in South African cities and particularly, Cape Town, but also assists the government's goal of reaching a substantial targeted economic growth rate of 6%?

The traditional transport planning approach in the modernist paradigm in South African and world cities paid very little attention to human and social needs relative to urban movement patterns. It was focused on a '*describe, predict and demand*' approach which relied on the technical expertise of road engineers to provide for the needs of the car. This approach also promoted 'the best distribution of resources, according to neo-classical market economics'

(Vasconcellos, 2001: 34). It is imperative at this crucial stage of Cape Town and South Africa's urban development context to address the crisis of transport, the accompanying developmental concerns and the issue of economic growth using public transport as a primary catalyst.

This paper argues that Cape Town has great potential to improve its (public) transport infrastructure and restructure itself into a more compact and equitable city form through investment in a city-wide system of urban nodes and corridors. It presents a theoretical basis for understanding:

- The direct relationship between economic growth and investment in public transport infrastructure [3]; and
- The potential of urban nodes and corridors to contribute to spatial restructuring to achieve a more integrated urban environment in a fairly young democratic city.

The paper explores these theoretical bases in relation to two South American cities that have invested in public transport infrastructure namely, Curitiba, Brazil and Bogotá, Columbia and draws lessons for Cape Town in respect of provincial and local government's intention to restructure and improve public transport within the Klipfontein Corridor (Klipcor).

Transport investment and development: exploring the linkages

It is crucial to examine firstly, whether there is some correlation between (public) transport infrastructure investment and economic growth; and secondly, whether urban nodes and corridors as a means of spatial re-ordering is a viable form of directing such investment.

Transport infrastructure investment and economic growth

It can be argued that provision of and investment in (public) transport infrastructure can advance or retard economic growth. It is important to define and distinguish economic growth and economic development. Economic growth 'is concerned with establishing increases in the economy's productive capacity and output' whereas 'economic development is concerned with improvements in the quality of life of the people living in the area' (Nattrass cited in Department of Transport, 1993: 3-1). This paper concerns itself with both concepts: economic growth *and* economic development.

One can safely assume that investment in (public) transport infrastructure would increase the regional economy's productive capacity and output mainly during the construction phase of the project given the nature and scale of such investment. For example, between 1986 and 1998 the United States federal and Oregon local governments spent in the order of \$1158 million on a 33 mile light rail public transit system comprising two separate lines (Minter, 1997: 12). It can therefore be argued that during the construction phase, 'expenditure on the goods and services required will have a multiplying effect and may add to the national income and increase the average income per capita, so constituting economic growth' (Department of Transport, 1993: 2-2) which will reflect as an increase in gross domestic product (GDP) [4]. This multiplier effect will continue while expenditure is being incurred and for some time after construction, after which 'it will eventually disappear and the national income will revert to its former level' (Department of Transport, 1993: 2-2). Hence, first advancing, and then retarding or levelling off economic growth.

This need not be the case, however, if certain provisions are made to support and reinforce the investment in (public) transport infrastructure and if investment in (public) transport infrastructure is not only measured by GDP as a means of measuring economic growth but also takes account of other quality of life benefits that would accrue as a result of the investment. These provisions include, among other considerations, that:

- resources such as equipment and materials are sourced locally and local labour is sourced from an unemployed pool;
- concurrent investment is sought in resources such as land located in proximity and strategically to the (public) transport infrastructure being developed and with potential to not only contribute to economic growth but also economic development as defined above;
- management of the new (public) transport infrastructure is in place to ensure ongoing operation and maintenance from an operational efficiency point of view;
- demand for public transport is consistently created through investment in higher order facilities and densities that rely on the (public) transport infrastructure; and
- a city development strategy (CDS) [5] is in place that embraces public transport as a means of adding value to the quality of life of all its citizens. The drivers of the CDS must not only have the necessary will, vision, funding and technical expertise to implement the strategy but also encourage land use planning, urban design and transport planning to form the basis of its spatial component.

Pearman *et al.* (2003: 109) also challenge the traditional view that ‘accessibility improvements from transport capital investment necessarily promote economic development.’ The authors do, however, support the view that ‘accessibility improvements must be supported by other prevailing positive market conditions in order for these combined benefits to potentially generate economic development impacts’ (Pearman *et al.*, 2003: 110).

It is well known that transport in general ‘is not usually demanded for its own sake, but that the demand for transport is derived from the demand for final consumption goods and services and for the raw materials and intermediate products that go into the production of final goods and services’ (World Bank, 2002: 12). While sharing this position, this paper contends that once provided and in place for these reasons, public transport in particular together with attractive urban public opportunities, will also generate demand for other purposes such as recreational trips, visiting friends and relatives, seeking general social encounters in the city, and so on.

The potential of Urban Nodes and Corridors towards Spatial Restructuring

Vasconcellos (2001: 36) emphasises that ‘human movement in space would be to search for an *anthropology of movement*.’ Thus, mobility is more than moving to work or home or in search of goods and services, but rather it is also about the daily encounters on a journey within the life-cycle of individuals and families, commuters and the unemployed, city dwellers and the urban poor. Simon (1996) reinforces the fact that transportation is about *all* modes of movement as well as the associated infrastructure and institutional arrangements and policies, issues of access to and use of transport by different groups, and the causes and implications of such considerations.

Viewing mobility and access in this holistic way, may question the underlying potential for urban corridors to succeed in generating positive economic growth at a metropolitan scale (Mammon, 2005). The holism is achieved in the combination of careful spatial / transportation planning and urban design. It is also achieved through recognising the locational value of urban nodes and corridors at strategic points, that in time, grow together to form the basis of economic growth combined with social, cultural and urban encounter in the city.

One of the primary objectives of spatial restructuring of a city through a transportation network is the integration of appropriate land-use planning and public transportation. This

should be combined with relevant infrastructure and operations for public transport, whilst promoting commercial development, densification and infill housing, appropriate public places and adequate space for NMT to occur. Spence (1998: 19) reinforces this point where ‘Appropriate transport routes should be used as key structuring devices to promote accessibility, integrate areas, and establish development opportunities. Transport must play an essential role in the public structuring process and in meeting the majority of movement needs.’

The Generic Nature of Urban (Activity) Nodes and Corridors

Planning intervention strategies to assist the conscious regeneration of cities globally include the development of particular routes (urban corridors) linking communities with key destinations and specific points (activity nodes) along these to reinforce the urban rhythm of stopping and moving, with particular focus on the pause points for interaction and in our context, *encounter*. The promotion of urban nodes and corridors within which public passenger services function, provide the principal means of *accessibility* and *integration*. This may be viewed as a ‘string of beads’, where the area of concern is not only a single bead, but the string and the pattern of interconnection between each bead to the whole (adapted from Rapoport, 1990).

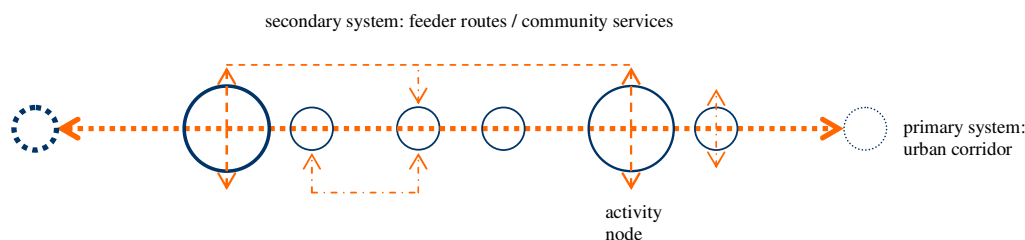


Figure 1 Diagram to show the ‘string of beads’

An ‘Urban Corridor’ represents a broad band of intensive mixed-use activity located around one or a number of continuous transportation routes along the line (le Grange *et al.*, 2004: 10). Continuous transportation routes carry or potentially could carry high volumes of people and therefore promote both public and private transport. Urban corridors must be spatially, socially and economically defined, in which transport operates effectively, positively and efficiently. In this instance, movement is but one of the components related to the energy and activities associated to a corridor.

With an increase in volumes of movement, there is a simultaneous increase in market demand and economic opportunities grow significantly, creating pull factors and areas of attraction. In effect, this encourages people to move between urban cells to access these energy attractors along the line or route. This is a necessity given the fragmented nature of urban contexts the world over where thresholds within the neighbourhood cells cannot sustain any form of economic activity and thus are unable to match peoples' day to day needs.

Urban (activity) nodes on the other hand, are the pulse points, stopping areas or nodes of development activated by clusters of economic activity and institutional facilities with associated and intensified land uses. Increased residential densities within the corridor band create urban generators for further growth and support the provision of institutional and educational buildings that are located within easy and safe access. Locating transport related infrastructure and facilities in close proximity to clusters of activities allows for intensive use and long term sustainability. A key issue is the safe passage of pedestrians and other forms of NMT to these urban generators.

Spatial Layers of Opportunity

There are four interrelated levels or layers of opportunity within which the restructuring to an effective, efficient and equitable urban transportation network should be considered:

- ***Strategic socio-spatial generators***- In many instances urban generators are not easy to access or are not directly related to existing public transport routes in urban areas. Within such urban generators are schools, sports fields, clusters of amenities, economic hubs (inclusive of formal and informal trade) and railway stations. Urban generators produce high thresholds of people and encourage economic opportunities, further supporting the prospect of public and private investment. These places *demand* integration with public transportation, NMT routes and qualitative public spaces;
- ***Non-motorised transport (NMT)*** [6] - The importance of economic sustainability for local areas where people walk or cycle to destination points is fundamental in the spatial restructuring of a city. Key linkages and connections are vital to enable the integration of public transport and the creation of 'safe zones' for all;
- ***Public assets and public transport***- A viable and functioning public transport system is an important and all encompassing public asset. In many situations there are long term concerns of the condition of infrastructure and maintenance, taking into account adequate sidewalk space, safe NMT routes, public transport stops, types of buses and

taxis, fare systems, controlled payment areas and the condition of the infrastructure;
and

- **Priority investments and appropriate land-use-** The placement of investments should occur at key locations such as appropriate transfer stops related to urban generators. Public investment along key routes and links for a range of services is vital to enhance the potential growth of urban nodes and corridors. Investment in public transport for example, community feeder services, along with investment in land development should be encouraged.

Defining the problem: the challenge of urban transportation planning in South Africa

The South African City in Context

The inherent modernist structure is still very much in place in South African cities such as Cape Town. Shifts to a more human orientated structure are difficult in a bureaucracy that is 'going nowhere slowly' for various reasons, most of which stem from post-apartheid integration and political struggles at all levels of government, particularly local government (McKenzie, 2005: 22).

In addition, *access* for urban residents in South Africa, who are dependant on public transport or NMT, is typically fraught with problems [7]. Those in wheelchairs and the physically challenged are even worse off. The physical inheritance of apartheid planning resulting in fragmented pockets of residential areas with little or no social and economic infrastructure pose considerable obstacles to the reorganisation of the city's spatial structure. 'The spatial precepts of apartheid accorded neatly with those of modernism' (Dewar & Todeschini, 2004: 13), taking the concept of fast flowing movement routes as a key directive to create spatial barriers to dislocate and separate the urban poor.

Travel journeys to work continue to be expensive for Black (traditionally classified as Indian, Coloured and African) people historically located on the outskirts of Cape Town. They continue to spend an average of 30 to 40% of their gross monthly income on travel costs and an average of 1 hour 5 minutes travelling per trip to and from work (de Saint-Laurent, B. 1998 as cited in Xhali, 2003). Compared to an international norm for cities in developed countries where 'between 8 and 16 % of urban household income is typically spent on transport, although this can also rise to more than 25% for the poorest households in very large cities' (World Bank, 2002: 5), 30 to 40% is high.

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For various reasons, car usage in Cape Town has increased by 50% between 1990 and 1999 (Arcus-Gibb, 2004). The majority of our urbanised population will never be able to afford a car and will continue to rely on more affordable means to access urban opportunities. However, in Cape Town, car ownership will continue to rise at 3% per annum (Cape Metropolitan Council, 1999) [8]. At the same time, this paper also questions whether South African cities should be solely structured around the car being the ultimate means of movement?

The metropolitan rail system is seen as the backbone of the existing public transport system and is still the most affordable service. However, old rolling stock, poor service management and unsafe rail stations and journeys prevent this system from being used optimally. The existing bus service operates where the rail system does not provide direct links. Currently, the different public transport modes still operate in isolation of one another and are managed in a fragmented manner.

Taxis provide an important public transport service in Cape Town. They fill an important gap in the public transport market as is the trend in most of the developing world. Writing on behalf of the informal sector economy in developing countries, de Soto (2000: 25) argues that 'unauthorised buses, jitneys and taxis account for most of the public transportation in many developing countries.' There are successful lessons that can be learnt from other developing countries that have embarked on processes where an almost impossible situation has been turned around positively through active public transport investment and management programmes.

It can be argued that Cape Town is still relatively manageable in terms of its scale and the need to respond to the transport problems and concerns raised above. It has not reached mega-city status as yet i.e. cities with over 10 million inhabitants as defined by the World Bank (2002: 5) which is where the transport problems become insoluble if not addressed early on in its urban growth process. Cape Town is estimated to grow from 3.2 million in 2005 to between 3.3 million and 4.2 million by 2021 (Smith, 2005: 4). Much growth of larger and mega-cities 'is likely to consist of urban sprawl, which militates against adequate public transport service supply, encourages auto dependence, and hence reduces accessibility to employment and to urban facilities for the poor and very poor' (World Bank, 2002: 5). Continuing on this basis would mean that the city remains fragmented, divided and inaccessible for the majority of its citizens in a young democratic city where integration, access and social encounter should be vigorously promoted at all levels.

Cape Town Context

The early establishment of Cape Town up to the 1960's experienced an urban development pattern and structure that responded to the natural structure. This resulted in the establishment of the historic corridors to the south-west (the southern suburbs along Main Road) and north-east of the city centre (the northern suburbs along Voortrekker Road). With the introduction of industrialization and the need for transport improvements up to the 1930's, the city grew along these corridors with the central business district (CBD) remaining the focal point of economic growth and development. The impact of modernism post the 1930's experienced growth of a more sprawling and technological change that catered for separation and increased movement through the introduction of freeways and larger road systems. The dominant spatial patterns since then included (City of Cape Town, 1999: 9; NM & Associates, 2002):

- Low-density sprawl;
- Fragmented inward-looking cells reinforced by barriers;
- Embedded social facilities;
- Separation of people and activities at a social and spatial level; and
- A fragmented pattern of urban open space.

The key question that arises is what happens to the city's urban development pattern after modernism? The primary lesson is that the two historic urban corridors resulted in a highly positive urban pattern at a human scale. These corridors led to the integration of movement, land use, built form, and circulation through the provision of an efficient spatial structure. The structure was based on a short block that facilitates permeability, circulation on foot and ease of access to public transport. The creation of urban nodes at key points allowed for economic and urban development along the corridors, for example Claremont along the southern suburbs and Bellville along the northern suburbs corridors.

Klipfontein Corridor in Context

Whereas the southern and northern suburbs corridors developed organically in Cape Town, the Klipfontein Corridor (Klipcor) is one of a system of corridors that require investment through planned intervention. As the first corridor earmarked for bold intervention, Klipcor needs to set the scene for the remaining corridors in Cape Town. It is therefore crucial to accomplish the optimal urban (restructured) condition so that it not only sets an excellent and

sustainable example, but also contributes significantly to the positive restructuring of Cape Town at a city scale.

Klipcor is a complex system of east-west mobility routes and north-south feeder links that connect to points along the main public transport route. These points of connectivity are seen as the new points of opportunity as they have the potential to generate high thresholds. The corridor system is seen to play a central role in urban restructuring and reconstruction within the Cape Metropole whilst making a considerable improvement to the local environment and lives of the surrounding communities.

A key guiding principle for Klipcor is that access, mobility and land-use cannot be disassociated within the integrated transportation network and management programme of the urban corridor if Cape Town's future planning for an inclusive and democratic city is to succeed.

Case study 1: Curitiba

The descriptions that follow have been summarised, among others, from two key sources. Firstly, the Urban Problems Research Unit (Minter, 1997: 7-11) and secondly, www.dismantle.org/curitiba.htm.

Background

Curitiba is the capital of the province of Paraná in the southeast of Brazil. The city grew from a population of nearly 500 000 in 1965 to 1.6 million inhabitants by 1990. The metropolitan region contained approximately 2.2 million people in 1997. As at 1990, unemployment was approximately 8%.

Principles of urban planning – Curitiba's Master Plan

A primary principle of the Curitiba Master Plan was to integrate transport with land use to address the radial expansion of the central city along linear arteries because the city outgrew its own physical limits based on this radial structure. Key principles underlying the plan included:

- Changing the radial urban structure to a linear one;
- Decongesting the central area and preservation of the historic centre;

- Demographic control and management;
- Economic support and urban development; and
- Infrastructure improvement.

The above principles were implemented through:

- Zoning and land use policies that promoted high density development along structural axes;
- Residential development along arteries with supporting bulk services (water, sewage, electricity, telephones);
- Making all development accessible to public transit;
- The deliberate closing down of vehicular access to Curitiba's business centre; and
- Returning the street to the pedestrian as well as making all transit points pedestrian friendly environments.

Investment in public transport and NMT

To manage and redirect urban growth from a radial to a linear pattern, Curitiba invested in an integrated city-wide transport system which relies on buses based on a trinary road system comprising three parallel roadways:

- A central roadway which is a dedicated two-lane busway, flanked by single-lane local roads designed to facilitate access to residential and commercial activities located along the axes;
- One block back to either side are high-capacity (2-3 lanes) one directional streets flowing into, and out from, the city centre used by both motorists and buses to facilitate mobility; and
- A pedestrian network covering an area equivalent to nearly 50 city blocks as well as proposing 150km of bicycle paths in 1992 were also means of investment to encourage safe NMT usage in support of public transport.

The cost of developing the system was \$200 000 per km at 1974 prices. Currently about 1100 buses make 12 500 trips per day, serving approximately 1.3 million passengers. The buses are privately-owned by approximately ten companies who receive no state subsidies. All mass transit money collected goes to a fund from which companies are paid on a distance travelled basis. In addition, a transit – oriented development tax abatement programme was established where investments in transit oriented programmes were rewarded with tax holidays over a ten

year period provided that a housing project to the city's minimum specifications was established within specified transit corridors.

It is also important to note that vacant land was carefully and strategically selected in relation to the siting and construction of the busway and accompanying stations. 'The busway stations in Curitiba are development nodes which act to attract commercial and residential development... The busway routes and development nodes are mutually beneficial' (Wright, 2001: 11).

It is not clear how the investment in the city-wide transport system contributed to economic development in terms of real GDP as a measure of economic growth. As stated before, GDP is not the only way of determining the success of large capital investments such as transport infrastructure (Sen, 1999). Other indicators are also important to determine whether investment and economic development has had a positive impact on a city. For example, Curitiba's percentage of population living below the poverty line decreased from 17.4% in 1981 to 12.2% in 1990 (Holanda, 1997) at which time its unemployment rate was approximately 8% (Minter, 1997 : 7).

A key institutional component and role played by local government was:

- The coordination of transport, land use planning and design, as well as engineering services;
- The planning and creation of investment in the public structure and infrastructure to support the operation of a viable public transport system;
- The intent on implementing a single 'Masterplan' or city vision to redirect urban growth in a positive development manner; and
- The creation of tax incentives to promote private sector investment in market-related sectors, such as land, housing, commercial and construction in general.

Summary

Transport and public transport in particular, was explicitly used in an integrated manner with land use planning as a central focus for sustainable development (Vasconcellos, 2005: 101).

The results of this approach over some 30 years include:

- An appropriate growth pattern that assists the central city's decongestion, urban conservation of historic built fabric and sustainability;

- While car ownership is still relatively high, there is a considerable increase in the use of public transport;
- Congestion has decreased as a result of a greater reliance on public transport and NMT as opposed to private vehicular transport;
- The public transport system is financially self-sufficient and requires no subsidised support from the state;
- A choice of transport mode has been established for the citizens of Curitiba;
- A new institutional arrangement was organised by establishing a special agency – the IPPUC (the Curitiba Institute for Urban Planning and Research), which had the necessary legal power to plan and control urban development, public transport, housing, environmental and health issues;
- While it is not clear from the literature accessed, to what extent employment creation has occurred as a result of investing in public transport in Curitiba, it would appear that:
 - sufficient evidence exists from the theoretical exploration (Pearman *et al.* 2003; World Bank, 2002) on economic growth above that when transport investment is combined with other positive market related investment programmes such as land and housing development, employment creation as a function of economic growth as defined earlier, is a direct consequence of such investment; and
 - economic incentives such as tax holidays created by government with the private sector relative to investment in transport infrastructure could result in mutually beneficial and sustainable economic development for the city and its partners.
- Commitment to a single ‘city vision’ was clearly demonstrated in the implementation programme over time.

Even if this model may seem successful, it implies ‘a paradox and a frustration: historical factors make the Curitiba experience so unique that it hardly may be transposed to any other large city in the country’ (Vasconcellos, 2005: 101). Curitiba has some of the highest private vehicle ownership and use rates in Brazil in selective high quality middle income areas. In the 1970’s road space in Curitiba was relatively extensive, which allowed the new bus corridors to be implemented in the road reserves provided without having to relocate the middle classes and their vehicles. This is not the case however in many developing cities today where there are changing road reserves and in some cases such as Cape Town these reserves are occupied by informal settlements that may need to be relocated.

Case Study 2: Bogotá

Background

Bogotá is the capital city of Colombia with 6.4 million inhabitants, 15.2% of the national population. The city covers an area of 173000ha and has a high density of 3717 inhabitants per km² (Hidalgo, 2005). The majority of the urban development occurs on relatively flat land, but there is a hilly section to the south of the city where there is informal development. There is a high economic growth rate of approximately 4.5% per annum. In the 1990's Bogotá's urban transport was characterised by severe congestion, poor road networks, and high occurrence of accidents with high levels of pollution. In addition, public transport was associated with slowness (an average trip used to last 1 hour and 10 minutes) and inefficiency where public service routes were incredibly long (30km average) operating on old buses with low occupancy and acute lack of security (Stockholm Partnership, 2002).

When Enrique Penalosa became Mayor of Bogotá in 1998, he asked a fundamental question which could be related to many developing cities globally, 'In Bogotá, where 85% of the people do not use cars for their daily transport, is it fair that cars occupy most of the space on the streets?' (cited in Runyan, 2003).

The focus after 1998 moved towards concentrating on the transformation of urban *mobility*, characterised by a high rate of investment and the rapid completion of an important number of infrastructure projects. Despite the deep economic crisis, poverty and considerable violence that Colombia continues to experience, the spatial, social, political and economic structure of the capital city has undergone fundamental changes since 1998 (Montezuma, 2005).

Principles of urban planning – Bogotá's Master Plan

Although the fundamental changes to Bogotá are most visible in spatial terms, the overall transformation has affected all dimensions of urban life. The master plan for Bogotá concentrated on safe and accessible pedestrian zones, upgraded road infrastructure and construction of new roadways, especially the implementation of bicycle paths, the revitalisation of parks and sidewalks and the implementation of the TransMilenio Bus Rapid Transit (BRT) system (Montezuma, 2005).

Penalosa's plan 'Por la Bogotá que Queremos' (For the Bogotá we want) included the following fundamental principles for an egalitarian city:

- De-marginalisation: inclusion and improvement of low-income residential and marginalised areas whilst promoting high citizen involvement;
- Social integration: based on the integration of a mass transport system; improved education and libraries for all;
- City on a human scale: improvements of city parks (more than 1200 parks were built or reconstructed), quality public space (plazas) and sidewalks, greening urban waterways, planting trees (over 100 000 trees were planted during 1998-2000), taking parking away from sidewalks and promoting pedestrians;
- Mobility: NMT and bicycle paths were seen as paramount with emphasis on awareness and education of transport i.e. Car Free day with massive popular support.
- Urbanism and services: provision of nurseries, libraries and high standard schools with quality technology and infrastructure services;
- Restriction of the use of the private vehicle: major implications for how people actively use public space and access public transport by decreasing the use of the private car.

The BRT system, TransMilenio involves separate bus lanes dedicated to public transport, with new articulated buses and recognisable and accessible stops. It follows the examples adapted in Curitiba with main arteries and feeder routes.

Investment in public transport and NMT

Transport, urban mobility and public space were the key issues around the transformation of Bogotá. Actions aimed to encourage NMT, to reduce private vehicle use and to give priority to public transport centred on the TransMilenio BRT system. The basic principles adopted were (Stockholm Partnership, 2002):

- Respect for life: improvement in road safety, reduction in accidents and reduced pollution;
- Respect for the time of the users of PT: reduced time travel by 50% to allow users to perform productive, recreational and cultural activities;
- Respect for human diversity: cater for all income groups recognising the difference between individuals giving everyone equal access;
- Quality: of vehicles, stations, access to stations;
- Consistency: regular and punctual service of international standards; and

- Affordability: accessible to all users, profitable for the private operators and fundable by the state.

The TransMilenio's infrastructure includes, 'exclusive corridors, roads for feeder buses, stations and complementary facilities. The articulated buses use central lanes of existing streets, longitudinally separated from the general traffic' (Díaz cited in Segaris, 2001). Within the main arteries, there are clearly defined stopping zones for the bus and waiting space for the commuter. Stops or standard stations are located in the median approximately 500m apart. These stops, which vary from 40m to 180m in length, are accessed by pedestrian bridges or overpasses. The feeder services branch into the overall system at transfer stations or intermediate integration stations where people can change to the corridor services. In some instances the corridor systems consist of 4 bus lanes (2 each way), 6 lanes (3 each way) of private transport and any additional services lanes resulting in a large cross section of more than 10 lanes.

Hidalgo (2002) confirms that infrastructure, planning, developing and controlling the system are provided by public entities, while operations and fare collection are provided by private companies through concession contracts. Phase 1 took approximately 48 months from design to implementation, with an average investment of US\$5million/ km (Díaz cited in Sagaris, 2001). By January 2003 over 270km of bicycle paths had been constructed becoming the largest network in South America and the developing world (Montezuma, 2005). By May 2003, demand was 792 000 passengers / weekday using 470 articulated buses and 235 feeder buses. The system operates 18 hours per day with 9 express services and 3 local services. Daily revenue is around US\$270 000 (Hidalgo, 2005). The TansMilenio attempts to cover the majority of main routes covering the entire city, linking subway and bicycle paths within a six phase scenario. In January 2003, Phase 2 was initiated. The impressive BRT system is intended to be expanded to 22 corridors covering a total of 388kms of exclusive lanes which are planned and implemented over a 15 year period.

Summary

Bogotá was based on the successful experiences in Curitiba, Porte Alegre in Brazil and Quito in Ecuador. However, Bogotá has managed to incorporate advanced technology for control of billeting and monitoring whilst creating sustainable working models for implementation and private partnerships. The cost of implementing the Transmilenio BRT system was relatively

low as it was based on an existing road infrastructure as compared to implementing a totally new system, making this a viable option for developing cities.

One of the major fundamental social changes is a positive attitude of the users themselves. The TransMilenio and associated facilities and infrastructure has radically improved the quality of life and given a sense of belonging and citizen ownership to the residents, and in particular the children of Bogotá [9].

The results of Bogotá's ambitious mobility strategy (Díaz cited in Sagaris, 2001; Hidalgo, 2002; www.transmilenio.gov.co) are as follows:

- The provision of a high quality and efficient transit system at a low cost is a principle for the TransMilenio BRT system where access is along corridors, with reduced travel time, accidents and pollution;
- A high quality environment and public space exists with the combination of reduced crime due partly to an increased presence of security and police agents at stops and around public places and facilities;
- Focus on mass transit, the promotion of NMT and the restriction of private vehicle use;
- Specialised and sustainable infrastructure and efficient operations in combination with advanced billeting systems that make the system operational;
- Public institutions control infrastructure and planning, whilst operations and billeting are contracted with private companies;
- Public participation, stakeholder engagement and involvement by citizens are paramount to the system.

However successful and impressive the model for urban transport and planning for Bogotá may seem, there are many associated problems and obstacles as well as economic recession, fiscal crisis and civil war in Colombia in general. There are also implications for the following phases of development influenced by institutional decisions, political changes and extreme positions on the way forward for an integrated system of mass transit.

The validity of transport and land-use planning in Bogotá, unlike Curitiba, has not been fully resolved. The territorial plan that considers the time frame from 2000-2010 was drastically reduced and does not include the construction of the subway [10]. Combined with this fact, the TransMilenio BRT was implemented without a clear integration into a larger urban

strategy. The analysis of transport in the city has been limited to the districts within the city boundary, which may in effect influence a negative regional development. 'Although the challenge of integration with surrounding cities is much more political than technical, leaders should begin to articulate an integrated scheme of multi-modal metropolitan transport' (Montezuma, 2005).

A further problem is still the use of the private vehicle and related parking problems, especially illegal parking lots on vacant or under-utilised land, which continue to create conflict between authorities and stakeholders. The restoration of sidewalks has reduced the available parking and deliveries / collection for businesses. A further obstacle lies in the fact that bicycles are often perceived as a less important mode of transport and a sign of destitution (Montezuma, 2005), although awareness campaigns are actively changing this viewpoint. Nevertheless, this emphasises the need for education and awareness taking into consideration all spheres of transport and different modes of NMT.

Transport infrastructure investment and city restructuring: Lessons for the Klipfontein Corridor

Lesson 1: A consensus-based single city vision or CDS- Curitiba had a very clear master plan which focused on directing growth, public transport investment and land use integration to achieve an efficient city structure. The city geared itself at an institutional level to achieve this goal working closely with external partners in the public and private sectors. Bogotá, on the other hand promoted the need for an efficient and equitable city where the focus centred on urban mobility, transport and public space rather than an overarching city vision. In both cases public participation was a key priority and informant in the planning process. In sum, it is crucial for cooperation at a participative planning, design, transport, engineering, conservation and ecological level to be achieved for the sustainable implementation of Klipcor as an urban corridor within the Cape Metropole.

Lesson 2: Investment in public transport infrastructure will lead to economic growth during construction but also on an ongoing basis provided that other positive market-related investment is pursued at the same time. Wolpe (2005) argues that a 'decade of macro-economic stability and first economy growth of 3-4% is paving the way for an acceleration of expenditure in social and economic infrastructure as well as a reduction in micro-economic cost constraints to global competitiveness.' One of the constraints to Cape Town's global competitiveness is the lack of a good public transport system. Wolpe (2005) therefore

recommends that a key global growth and simultaneous local equality strategy is ‘accelerated investment in transport and telecommunications logistics infrastructure.’

The case of Curitiba demonstrates this well over the long term and Bogotá over the relatively short term where investment in public infrastructure and the public realm was encouraged by the public institutions. Furthermore, in the case of Curitiba economic incentives such as tax holidays created by government with the private sector relative to investment in transport infrastructure resulted in mutually beneficial and sustainable economic development for the city and its partners. In relation to Klipcor, this could also form part of Local Economic Development (LED) incentives, public-private partnerships and empowerment at a localised level actively involving communities living within the corridor, as well as the local taxi industry, among other stakeholders.

Lesson 3: With respect to land, the Curitiba model guides two important lessons: Firstly, that vacant and under-utilised land can be used in conjunction with transport investment programmes to achieve a restructured city. Changes in land use allowed for denser occupation. Also, sustainable city restructuring occurred over a long period (30 years in the case of Curitiba) and was guided by an over-arching long-term city vision. This emphasised strategic public-private investment for integrated and urban development. For example, the busway stations, urban land-uses were coordinated at strategic points on the structured axes created. In the case of Bogotá, vacant land was not a key consideration conceptualised in a unified urban spatial structure, although there was extensive investment in public spaces and parks. As far as Klipcor is concerned, strategically located vacant and under-utilised land could present one of the possible solutions for positive economic urban impact through:

- creative mixed use land-use proposals in areas that are presently undergoing transformation in response to market demands;
- incremental upgrade and redevelopment of existing economic hubs and underutilised institutional land;
- adopting strategies to re-appropriate land set aside historically as social buffers and for road purposes; and
- the strategic location and integration of transport stops, urban development and other urban generators.

Lesson 4: Bogotá’s transportation investment programme is space extensive given that the transport system utilises wide road reserves to operate effectively. This questions the human scale and urban nature of the Bogotá model. Given that the Bogotá intervention is relatively

young compared to Curitiba, the dilemma to provide for the private vehicle as well as promote public transport (articulated primary system and feeder secondary service) at the same time remains a challenge for Bogotá. In the case of Curitiba, the so called trinary intervention is not necessarily appropriate for Klipcor given that although activities and transport occur in the same precincts the separation of people, transport and land use in the cross section calls into question the validity of a model of this nature for Klipcor. The latter needs an interactive zone to mediate transportation, activities, people and space effectively. In the Cape Town context it is necessary to provide for a range of activities, encounters and movement to begin to achieve a restructured urban pattern and a true democratic city.

A more appropriate consideration for Klipcor is São Paulo in Brazil, where the urban cross section has resulted in a more compact, human scaled intervention, even though it is apparent that the city-wide system does not operate as an integrated network (Golub & Hook, 2003). This cross section allows for pedestrians and NMT to interact directly with public and private transport as well as land use interfaces at grade, encouraging a more dynamic urban condition. However, Vasconcellos (2005: 94, 96, 100) [11] argues that ‘...the use of private transportation... increased from 26% in 1967 to 48% in 1997’ and that ‘Overall public transport demand increased up to 1987 and then decreased by about 12%.’ These figures may be related to changing work patterns, shifting economy and affordability, urban changes, access and travel time, but a major factor being for the continued prioritisation of private cars and motorcycles (2002 data, Vasconcellos, 2005: 100). This is a somewhat concerning set of data considering that São Paulo is often used as a viable precedent for public transport systems. Vasconcellos (2005: 96) further notes that the ‘new arterial streets did not have any special physical operational devices to ease the circulation of buses and no special traffic arrangement scheme was organised to improve bus operation.’ Nevertheless, this type of cross section promotes the idea of urban nodes, where there is a need for concentrating transport related facilities so as not to create congestion and an inefficient public transport system.

Lesson 5: It is not appropriate to import directly to Klipcor the spatial configurations or structure of the public transport system used in the case of both Curitiba and Bogotá. As indicated above, Cape Town must take its cue from the positive functioning of the historical corridors along the southern and northern suburbs. For this reason, the system of urban nodes and corridors is proposed as a tool for restructuring the city of Cape Town to achieve:

- the positive characteristics of a clear and permeable urban structure reinforced by key public transport routes that are supported by high density residential thresholds

located adjacent to these routes and offer many choices which are accessible by foot and other NMT;

- a fine scale and grain of the built fabric, as well as a finely textured mixed land uses;
- a range of public facilities and spaces of a higher and local order scale; and
- agglomerations of scale and economy through clustering urban generators that begin to facilitate the restructured urban environment.

Lesson 6: There are two interesting factors associated to the Bogotá case that resonate with Cape Town and the Klipcor restructuring process. Firstly, the taxi and old bus systems were retained as feeder services to the new BRT and at the same time, bus and taxi drivers were paid a minimum wage irrespective of the number of trips they made in a day. This changed the behaviour patterns of bus / taxi drivers for the better since their wage income was no longer dependent on the number of trips made on a daily basis. Secondly, the operators of the old system were included as a key stakeholder in the operation of the BRT through very skilled 'seduction' teams that convinced them to participate in the scheme in a meaningful manner through creating incentives that are more sustainable in the long term (Sandoval Castro, 2005).

Lesson 7: It is imperative that the institutional capacity, political will and financial ability are in place to support public and private investment in city restructuring through integrated public transport and land use planning and design. Both cases discussed above show a commitment to these institutional necessities. At the same time commitment to a long-term city vision that is supported by the public at large has to drive these institutional imperatives. One of the key institutional problems that must be addressed in the case of Klipcor is the fragmentation of responsibilities across the three spheres of government (McKenzie, 2005: 22) [12]. Fragmentation by its very nature not only clouds the levels of responsibility within the government spheres, but also prevents cooperation among these spheres and external partners as well as the citizenry to work together in building a positive urban foundation. The Klipcor requires visionary leadership linked to political will to achieve a restructured urban condition.

Conclusion

Vasconcellos (2001: 232) reminds us that 'Transport is a vital component of any society. It ensures communication, integrates space and activities, induces or guides investments and urban development, and is an essential input into the economy.'

This paper argues that as a relatively small sized city, Cape Town has great potential to improve its public transport infrastructure for the citizens. At the same time, this could also result in a more compact and equitable city form through investment in a city-wide system of urban nodes and corridors based on an integrated planning approach.

Economic growth is almost certain during the construction phase of the public transport infrastructure and can continue thereafter provided that simultaneous investment is directed to other market-related sectors directly reinforcing the public transport investment areas. These sectors include: land development and construction, housing, higher order public facilities e.g. institutions such as hospitals and so on, requiring investment over the long term.

The paper draws the following lessons for Klipcor from two South American cities that have invested in public transport infrastructure namely, Curitiba, Brazil and Bogotá, Columbia:

- It is crucial for a consensus-based CDS to form the basis of city restructuring and investment;
- Economic growth and incentives in public-private partnerships relative to investment in transport infrastructure can result in mutually beneficial and sustainable economic development;
- Vacant and under-utilised land can play a key role as a market-related sector to be invested in at the same time as investing in public transport infrastructure;
- The spatial configuration of the transport systems adopted by Curitiba and Bogotá are not necessarily appropriate for Klipcor;
- Considering the long-term success of Cape Town's urban growth corridors, a system of urban nodes and corridors is an appropriate tool for restructuring and directing public transport here;
- All operators of existing public transport services should be included as key stakeholders in the future restructured public transport system;
- It is imperative that the institutional capacity, political will and financial ability are in place to support public and private investment in city restructuring through integrated public transport, land use planning and design.

End Notes:

[1] Transportation systems have undergone radical improvements in sustainable transportation systems in numerous developing cities, including Accra, Bogota, Curitiba, Dakar, Dar es Salaam, Jakarta, Mexico City, Quito and many more.

[2] **Klipfontein Corridor (Klipcor)** is one of a number of core transportation routes in Cape Town that were identified as part of a Mobility Strategy promoted jointly by the Western Cape Provincial Government and the City of Cape Town since 2003. The Klipfontein Corridor is earmarked as the first (restructured) public transport

contract to be implemented in Cape Town on a restructured and rationalised public transport network. The public transport restructuring concept includes among others, urban nodes, corridors, NMT, the development of strategic vacant land and public facilities / spaces. The vision for Klipcor is directed by a framework entitled 'A Spatial and Design Concept for the Klipfontein Corridor'.

[3] **Transport infrastructure investment** is prefixed by (public) throughout the paper implying that the theoretical examination refers to any form of transport infrastructure investment. However, the paper wishes to emphasise investment in public transport infrastructure.

[4] **Gross Domestic Product (GDP)**: a calculation method in national accounting is defined as the total value of final goods and services produced within a country's borders in a year, regardless of ownership. It may be used as one of many indicators of the standard of living in a country (<http://www.en.wikipedia.org>). GDP is often seen as *an individual indicator* of development related to industrialisation, the rise in personal income, technological advance, social modernisation and so on. However, this view may be argued as an unrealistic perspective of development (Sen, 1999).

[5] **A city development strategy (CDS)** is 'an action plan for equitable growth in cities, developed and sustained through participation, to improve the quality of life for all citizens' (World Bank, 2002: 12).

[6] **Non-motorised Transport (NMT)**: Non-motorised transport (NMT) is defined as any form of movement that does not rely on battery and/or fuel combustion driven mechanisms to be propelled. Examples include: walking, cycling, per-ambulating, using donkey, horse or human-drawn carts / trolleys, rickshaws, and so on. NM & Associates, 2004 for further detailed review on NMT.

[7] According to Behrens (CoCT, 2003: 62) 'walking accounts for 36% of all trip purpose main mode use, and therefore despite considerable car dependence, remains an important mode of transportation.' However, since Cape Town's data focuses on motorised forms of travel, 36% of all trip making is excluded. NMT is only beginning to enter the public transport planning agenda in Cape Town.

[8] *The Mail & Guardian* (2006) states that the motor industry reported record sales for 2005 of more than 600 000 units, of which a large percentage is from domestic sales in South Africa. Dewar & Todeschini (2004: 23) confirmed the growth in car ownership was 37% over a 30 year period from 1970 to 1990 in South Africa.

[9] This sense of pride in the city of Bogotá manifests itself in events such as 'car free' day (<http://www.ecoplan.org/carfreeday/bogota/bogota1.htm#day>) and an evening in December 2002 when more than 3 million people celebrated in the streets at the "ciclo-vía nocturna" (night ciclo-vía) (Montezuma, 2005).

[10] The subway is a fundamental element of the future Integrated System of Mass Transport in Bogotá. The construction is not seen within the next 10-15 years. Nevertheless, without it, mobility will become increasingly difficult. A city the size of Bogotá requires a high capacity to transport 60 000 to 90 000 passengers an hour in each direction (Montezuma, 2005).

[11] Golub & Hook (2003: 14) confirm that São Paulo has seen a rapid rise in car ownership over the past 20 years with 1 million cars added to the São Paulo streets since 1987.

[12] Vasconcellos (2005: 95) reiterates the problems experienced in São Paulo between Federal, Regional and Local level of public arrangement with permanent lack of coordination.

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