

**IS SUCCESSFUL INTEGRATION OF LAND-USE AND TRANSPORT
PLANNING CENTRED AROUND A CATALYTIC CITY-WIDE PUBLIC
TRANSPORT NETWORK IMPROVEMENT PROJECT?**

BY

SHELA PAULINA POLLY BOSHIELO

STUDENT NUMBER: BSHSHE 001

**A 60-CREDIT RESEARCH DISSERTATION PRESENTED FOR THE
FULFILLMENT OF PART OF THE REQUIREMENTS FOR THE DEGREE OF
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SUPERVISOR: PROF. ROGER BEHRENS

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ABSTRACT

This case study showed that land-use and transport planning in South Africa are not successfully integrated. In addition, the institutional arrangements governing land-use and transport planning are not properly aligned and operate in silos. This study investigated various mechanisms that can be used to successfully integrate land-use and transport planning. The main purpose of this study was to find the common key features of successful integrated land-use and transport planning.

The study was based on a case study method. The data was collected from secondary sources in three widely-acclaimed international cities that have implemented land-use and transport planning. The major finding of the study was that successful integration of land-use and transport planning are centred on a catalytic city-wide public transport network improvement project. All three international case studies (Curitiba, Portland and Copenhagen) that were studied, have successfully integrated its land-use and transport planning, and had a catalytic public transport network project at its core.

The study concluded that, to be successful, the integration of land-use and transport planning need to be centred on a catalytic city-wide public transport network improvement project.

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- My family, sisters, brothers and all my friends and comrades for your support and encouragement.

DECLARATION

I hereby assert that:

- (i) This dissertation is my own work and I have not received any assistance apart from the normal guidance from my supervisor.
- (ii) This dissertation has not been submitted for a degree in the University of Cape Town or any other University.
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Signed by candidate

Shela Paulina Polly Boshielo

Student number: BSHSHE001

October 2018

DEDICATION

This dissertation is devoted to my husband and soul mate, Mr Benny Boshielo, for always been there for me, and for his undying support. My love, you really supported, encouraged and motivated me throughout my studies. You are indeed the wind beneath my wings! On your tall and broad shoulders, I stand!

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Several attempts have been made South Africa to improve and integrate public transport systems, with little success (Walters, 2014). People travel long distances to access socio-economic activities such as workplaces, schools, shops, and libraries. The longer the distance, the more time it takes to reach the destination. The travelling distances also have impact on the cost factors. If public transport is not integrated, the number of trips undertaken to reach the destinations increases, which have an impact on the travel times and costs (Moore et al., 2007).

It is thus important that people should be located nearer to where socio-economic activities are taking place. Origins and destinations should be linked during the planning stages to avoid long travelling distances. Proper planning can assist in decreasing the number of trips undertaken and the associated costs. If origins and destinations are close to each other, the accessibility of a location could be much easier (Berke et al., 2006). The integration of land-use and transport planning can thus play an important role of improving accessibility (Walters, 2014).

1.2 Background of the study

The functions of land-use and transport planning in South Africa are spread in various departments at different spheres of government. This presents a challenge in terms of integration of land-use and transport planning (Walters, 2014). For instance, the Department of Transport is responsible for transport planning, while the Departments of Cooperative Governance and Traditional Affairs (COGTA) and Human Settlement are jointly responsible for land-use planning. In addition, land-use and transport planning functions are allocated to the provincial and local spheres of government.

Many attempts were made by the South African government to integrate the land-use and transport planning functions. Though the legislative frameworks and policies to integrate the two functions are in place, the mechanisms to integrate the two functions seem to be lacking (Walters, 2014).

Land-use patterns have implications on the travel requirements and the transport system needs to fulfil them (Berke et al., 2006). In order to successfully match the travel requirements and transport system needs, land-use and transport planning must be integrated. In this regard, many countries have used different mechanisms, depending on their unique circumstances, to integrate land-use and transport planning successfully (Pojani and Stead, 2015). Some of the mechanisms can be used in South Africa to integrate the land-use and transport planning functions (Walters, 2014).

1.3 Problem statement

The government of South Africa is categorised into three levels, that is, National, Provincial and Local spheres. In accordance with the Constitution of the Republic of South Africa (1996), public transport, regional planning and development are both the competency of the Provincial and National spheres of government, while the Local sphere is accountable for municipal planning and municipal public transport. This means that the provincial planning, provincial roads and traffic are the competency of the provinces. The municipal roads, traffic and parking are the exclusive competency of the local government.

In accordance with the National Land Transport Act (2009), “the Minister of Transport must recommend principles that apply for the determination, formulation, development and application of land transport policy in South Africa”. According to the Act, the “Minister is responsible for the coordination between the three levels of government and public entities with a view to evade duplication of efforts and resources”. The Minister should also promote effective integrated transport planning.

The function of the Member of the Executive Council (MEC), in terms of the National Land Transport Act (2009) is to “promote inter-governmental relations within land transport in the province, including land-use management, environmental issues, population growth, economic development and investment in infrastructure, to facilitate integration and efficient transport”. Provinces are responsible for the “coordination between municipalities with a view to ensuring effective and efficient execution of land transport in the province and to liaise with other government departments in the national and provincial spheres with responsibilities that impact on transport and land-use planning issues, and bringing together key players” (National Land Transport Act, 2009).

According to the National Land Transport Act (2009), “municipalities are responsible for developing land transport strategy and policy, within their jurisdictions based on provincial and national and guidelines, which includes their vision for the area and incorporates spatial development policies on matters such as densification and infilling, as well as development corridors”. The Municipalities must also ensure that there is proper “coordination between departments and agencies at the local sphere for duties that impact on transport and land-use planning matters, and bringing together relevant officials (National Land Transport Act, 2009).

The Municipal Systems Act (2000) prescribes that “municipalities must formulate Integrated Development Plans (IDP), which should include a spatial development framework and development strategies. The Department of Cooperative Governance and Traditional Affairs (COGTA) is accountable for the formulation and regulation of Integrated Development Planning (IDPs). The Department of Rural Development and Land Restitution (DRDLR) formulates and regulates Spatial Development Frameworks (SDFs) and Land-use Management (LUM) through Spatial Planning and Land-Use Management Act (SPLUMA) of (2013).

Land-use and transport functions are located in all the three spheres of government, including public entities, as indicated above. There is no single entity or department that is accountable for the harmonisation and execution of land-use and transport planning functions. Despite well-intentioned legislative frameworks, they fall short on making integration effective in practice. The legislation does compel the Integrated Transport Plan (ITP) to be part of the Integrated Development Plan (IDP), and for the Spatial Development Frameworks (SDF) and ITP to take account of each other. The intention is clear but the mechanisms to integrate the two functions are not clear. As a result, this study reviews different mechanisms that can be used to integrate the two functions successfully in South Africa, using different case studies.

1.4 Aim of the study

The research was motivated by an observation and concern that land-use and transport planning are not properly cohesive and aligned in South Africa. Different spheres of government, including the public entities, are concurrently responsible for the two functions. However, there is no single entity that is accountable for the coordination and execution of land-use and transport planning functions. The current public transport infrastructure is largely based on spatial planning where socio-economic activities are not related to residential areas. Furthermore, private motor vehicles are still given priority in terms of planning and investment.

The aim of the study is to review various mechanisms that can be applied to integrate land-use and transport planning functions successfully in South Africa. It is apparent that land-use and transport planning has an important role to play in creating sustainable cities. However, the delivery of sustainable cities to be successfully necessitates strong integration of land-use and transport planning. A city-wide public transport network is thus necessary and can serve as a mechanism to integrate land-use and transport planning.

Consequently, case studies were used in this study to test a proposition that successful examples of land-use and transport integration are centred on a catalytic city-wide public transport network improvement project.

The research answers the following questions:

- (a) *Why is it necessary, from a theoretical perspective, to integrate land-use and transport planning?*
- (b) *What does the South African legislative/policy/strategy framework stipulate with respect to the integration of land-use and transport planning, and how effective has this been in practice?*
- (c) *Which international cities have been successful in integrating land-use and transport planning, and what lessons can be learned from them?*

1.5 Dissertation outline

This research dissertation is comprised of seven chapters. These chapters are briefly outlined below:

Chapter 1: Introduction: This chapter presents the introduction of the study, study background, problem statement and research aim.

Chapter 2: Research method: This chapter provides the research design and method followed in conducting the study.

Chapter 3: Theoretical perspective on the land-use transport relationship: This chapter provides a theoretical perspective that links land-use and transport planning system.

Chapter 4: South African legislative and policy frameworks: This chapter provides an in-depth synthesis of the South African legislative and policy framework on land-use and transport planning.

Chapter 5: International case studies: This chapter analyses different international case studies that have successfully integrated land-use and transport planning.

Chapter 6: Presentation of the results and discussion of the case studies:

This chapter presents results and discussion from the three case studies.

Chapter 7: Conclusion and recommendations: This chapter provides the conclusion and recommendations of the study.

1.6 Definitions

In this research dissertation, the following definitions apply:

- (a) Land-use planning:** “refers to the purpose for which land is used lawfully in terms of a land-use scheme, existing scheme or in terms of any other authorisation, permit or consent issued by a competent authority, and includes any conditions related to such land-use purposes” (Spatial Planning and Land Use Management Act, 2013).
- (b) Land development:** is the “erection of buildings or structures on land, or the change of use of land, including township establishment, the subdivision or consolidation of land or any deviation from the land-use or uses permitted in terms of an applicable land-use scheme” (Spatial Planning and Land Use Management Act, 2013).
- (c) Transport planning:** refers to “planning of the operations and development of transport, as well as the efficient and equitable allocations of resources” (Western Australian Planning Commission, 2012).
- (d) Integrated Development Planning (IDP):** refers to a “development plan prepared by a Municipality in accordance with Chapter 5 of the Municipal Systems Act”.
- (e) Integrated Transport Plan (ITP):** is a “comprehensive plan that guide the existing and future transport system requirements within an area” (Western Australian Planning Commission, 2012).

- (f) Integrated Public Transport Network IPTN):** means “a system in a particular jurisdiction that links public transport services between modes, with through-ticketing and other appropriate mechanisms to provide users of the system with the optimal solutions to be able to travel from their origins to destinations in a seamless manner” (National Land Transport Act, 2009).
- (g) Mobility:** refers to the ability of goods and people to move physically from one point to the other (Western Australian Planning Commission, 2012).
- (h) Accessibility:** refers to the “capability of people, including elderly, disabled and those with young children to move around and to reach places, facilities and services” (Western Australian Planning Commission, 2012).
- (i) Bus Rapid Transit (BRT):** is a “high-quality bus-based transit system” that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service (BRT Planning Guide, 2007).
- (j) Value capture:** refers to a “prospect to make incomes by capitalising on the value created by infrastructure investments (often transit and other government-backed projects) by developing or selling property or collecting fees or taxes. Value capture can be facilitated through direct measures, such as the sale of properties or the granting of a development franchise, or through indirect methods, such as extracting surplus from other property owners (through betterment tax, for example) or reaping higher proceeds from regular property taxes” (Suzuki et al., 2013).
- (k) Integrated land-use and transport planning:** refers to a “planning process in which land-use attributes, origin-destination choices, modal choice and transport network efficiencies are jointly considered at the beginning and throughout the process” (Western Australian Planning Commission, 2012).

CHAPTER 2: RESEARCH METHODOLOGY

2.1 Introduction

Research problems can be expressed in the form of research questions. Therefore, there is need to gather information so as to answer research questions. Research involves the gathering of information, analysis and interpretation. Consequently, research questions serve as a mechanism of focusing on the research problem (Mouton, 2001).

In this chapter, the research method followed during the research process is discussed. However, it is imperative to indicate that “a research design is the logic that links the data to be collected, and the conclusions to be drawn from study research questions” (Yin, 2000). Therefore, the type of study undertaken should assist in providing suitable responses to the research questions or problem. As also outlined by Mouton (2001), the type of research design, reasons why the design was selected, possible challenges and limitations in the design are discussed in this chapter. The research methodology of a dissertation takes into account the reason behind the method applied during the research study and why a particular method or technique was used (Kothari, 2004). This chapter further outlined the units of analysis, approach for case study, analysis, interpretation and short comings.

2.2 Units of analysis

According to Mouton (2001), the unit of analysis simply denotes to the object, phenomenon, entity, process or event of the study. When this object is a real-life phenomenon, it is referred to as an empirical research problem. In addition, research that emphasise on the construction of models and theories, as well as analysis of concepts or reviewing the body of language are referred to as non-empirical research (Mouton, 2001). It is evident that the units of analysis in the research study are both empirical and non-empirical. In terms of empirical studies,

case studies and secondary data analysis (SDA) were applied. In terms of non-empirical studies, literature reviews were applied.

2.3 Case studies

Yin (2000) indicated that “case study is a pragmatic inquiry that examines a contemporary occurrence within its real-life context, particularly when boundaries between phenomenon and context are not evidently”. The case study method encompasses a complete and vigilant observation of a social unit, an institution, organisation, government departments, cities or countries as cases. The interrelations and processes that take place within the unit of analysis are discussed (Kothari, 2004). This study applied the case study approach in order to understand better how the international cities chosen have been successful in integrating land-use and transport planning, and what lessons can be learned from them with respect to the role of city-wide public transport network improvement projects.

Secondary data and information was gathered from literature review. The literature was synthesised from numerous sources, such as journals articles, books, reports, legislations and policies. The literature was searched for the most often cited examples of successful land-use and transport planning integration cities. The initial group of cities selected included: Singapore, Bogota, Stockholm, Curitiba, Portland, Copenhagen, Toronto and Hong Kong. The case study selection and investigation was based on the following key thematic areas: (i) City profile; (ii) *Processes of the integration of land-use and urban planning*; (iii) *Integrated public transport planning and city-wide network programmes*; and (iv) *Institutional arrangements*.

After searching through the relevant literature, the cities that had similarities with South Africa, based on the above-mentioned key thematic areas, were selected for further analysis. The selection of cities for case study investigation was based on the availability and accessibility of literature in the public domain. The other advantage for selecting those cities is that they are often cited as best examples of successful integration of land-use and transport planning.

The criteria applied for the selection of final three cities were based on their successful integration of land-use and transport planning; successful integration of public transport network; similarities in the institutional arrangements with South Africa, as well as political and socio-economic status; availability and accessibility of material for desk top analysis; and comparable attributes with regards to land-use and transport planning. Case study analysis was used to test a proposition that successful examples of land-use and transport planning integration are centred on a catalytic city-wide public transport network improvement project. The three cities selected for the case study analysis are:

(i) Curitiba- Brazil

Curitiba is known internationally as a model of urban ecology planning and also for innovative planning, mostly its public transport network system. It is also respected internationally as a model for urban development, which is perfect appearance for a liveable city (Macedo, 2004).

Rabinovitch (1996), the “land-use policy in Curitiba is founded on legislatively designated special areas that merit integration with the transportation system or require special protection”. These are areas restricted geographically by roads and zones within a district. It appears that the “Curitiba’s land-use legislation might be good, but there are concerns around the relationship between urban growth and land regulation. Therefore, the legislation has not only exhibited a fixed physical dimension, but also a vibrant one over time”. However, it has evolved overtime with the growth of the city, but without losing the fundamental principles of the Curitiba Plan (Rabinovitch, 1996).

(ii) *Portland- Oregon, United States of America*

Portland initial growth was as a result of a regional centre and port, which serve the Pacific Northwest and Columbia River Basin. It plays an important role as a regional finance, service centre, and transportation links, which has attracted many industries, particularly those dealing with electronics. The Portland city is well known for its finest policy dealing with revitalisation, community development, urban planning, growth management, and regionalism (Gibson and Abbott, 2002).

Portland's state-wide land-use planning programme and its directed creation of urban growth boundaries are regarded as examples of success. The Portland-Vancouver Metropolitan is the area where land-use planning began to be implemented. This was in-line with Goal 14 of SB 100, which requires cities and counties to comprehend new development inside of the boundaries of urban growth so as to take into account the urban development and growth (Kline et al., 2014).

Any land-use "development outside urban growth boundaries was significantly restricted". Development was also restricted at land zoned for forest and agricultural usage. Land which has been zoned for non-forest and non-agricultural use, as well as land considered to be inappropriate for non-urban use, were designated as "exception areas", which thus requires approval from local authorities to develop such areas (Kline et al., 2014).

Portland plans use an urban-growth boundary to manage urban growth, which was also successful in reducing people's dependency on private cars. The plans are also used to increase the area's population density, public transport network (transit) initiatives, as well as promotion of mixed-use development and construction of high-density infrastructure (O'Toole, 2007).

The key elements in Portland's success in the integration of "land-use and transport planning" emanate from good partnership among governments during the implementation of strategies (Arrington, 1996).

In the United States of America, the city region is served by the elected Metropolitan government. The authority to structure regional spatial planning, as well as the administration of urban growth boundary rest with Metro. This assist in maintaining compact and efficient urban growth system (Gibson and Abbot, 2002). In 1995, the city of Portland adopted the Region's 2040 Growth Concept Plan. The adoption of the plan was in partnership with municipalities, NGO's, state and regional government. After its adoption, it became the most comprehensive and inclusive planning document for the Metropolitan region (Rae and Summers, 2016).

The Metro's Region 2040 land-use and long-range transportation was founded based on two fundamental principles: (a) testing of alternative future transportation and land-use plan; and (b) the political will and its legal authority to execute regional plan (Arrington, 1996).

Due to better Comprehensive Plan of 1980, the City of Portland was considered as a national leader in the integration of transportation and land-use. The 2035 Comprehensive Plan took forward its traditional planning approach, but enhances new novelties that contain a 20-year Transportation System Plan (TSP) to direct transport investments in Portland. The state and regional planning requirements was realised through the TSP, which further addresses local transportation desires. The TSP is, therefore, considered as an implementation tool, as well as a supporting plan, to the Comprehensive Plan (Comprehensive Plan Update, 2016). The regional growth was then shaped by the rollout of light rail, which becomes essential in coordinating land-use policies with transportation investments (Arrington, 1996).

In Portland, light rail is considered an essential investment that is used to deal with increased transportation pressure of growth in main corridors. The rail serves as a catalyst system for execution of land-use and transport plans by influencing the location and shape of development. Metropolitan light rail system influences the location, design and timing of development (Arrington, 1996).

(iii) *Copenhagen- Denmark*

The Copenhagen City surroundings was destroyed in 1856. The immediate city surroundings were exposed to rapid urban expansion with little or no intervention from the public. This spontaneous city growth was witnessed in the late 19th century. However, it was accompanied by problems, such as poor sewerage and housing, as well as spawned urban planning, which set the guidelines to control city sprawl (Vejre et al., 2007).

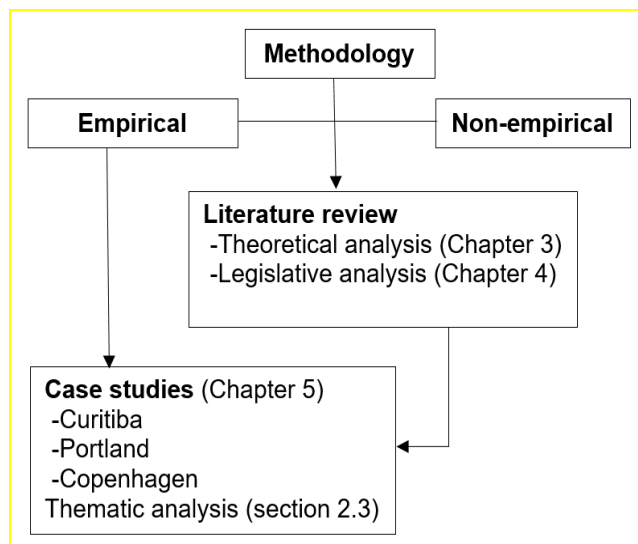
Nevertheless, as emphasised by the Copenhagen City Council's acquisition of neighbouring villages, the city growth pattern remained as a 'layer upon layer' structure. Consequently, a detailed and comprehensive plan for the growth of green structures around the Copenhagen city was published. The plan was partially built from the 1929 urban plan for Copenhagen, as well as the 1947 Finger Plan. The planning processes was, however, delayed by the World War II, nonetheless during the last months of the World War II, some planners reinitiated the work, which ultimately led to the development of the 1947 Finger Plan (Vejre et al., 2007).

The two Municipal Plans for Copenhagen together with the National Planning Statement of 2000, Regional Plan of 2005, as well as the Finger Plan of 2007, promoted urban development and densification closer to public transport nodes. These urban expansion principles are articulated and associated with the sustainable goals, which are clearly illustrated in the municipal plans of Copenhagen, where also improved conditions for bike travel and measures to reduce car travel in the city centre are included (Danish Ministry of the Environment, 2007).

Between 2005 and 2009, the Copenhagen Municipal Plan, in-line with its Finger Plan, strategically places passenger transport in close vicinity of the public transport nodes. An effective public transport system is thus considered the mainstay for sustainable transport system, which is the key for improving sustainable development. This includes also a compact and denser urban structure around the nodes. This was further illustrated by a variety of projects that explored the potentials of sustainable urban areas (Danish Ministry of the Environment, 2007).

2.4 Short comings and sources of error

The study could not explore more than three case studies because this was a 60-credit dissertation and time was, therefore, constrained. In addition, there could be limitations on secondary data analysis and literature reviewed on land-use and transport planning due to lack of free accessibility of journal articles. In addition, few cities in 'Global South' have been extensively researched on integration of transport and land-use planning, which thus limited the case study selection. A flow diagram of methodological steps followed is illustrated below:



2.5 Summary

The research methodology and design of this study were discussed. The purpose and the research problem were identified and key questions stated. Data collected and methods used were also discussed. In the next chapter, theoretical perspectives on the land-use and transport planning relationship has been reviewed and discussed in detail.

CHAPTER 3: THEORETICAL PERSPECTIVES ON THE LAND-USE AND TRANSPORT RELATIONSHIP

3.1 Introduction

In this chapter, literature review was explored. This chapter has answered key research question on “*why it is necessary, from a theoretical perspective, to integrate land-use and transport planning*”. Given that the successful integration of transport and land-use and planning is considered an appropriate or desirable outcome, what range of instruments or mechanisms should be in place to promote it?

Moore et al. (2007), in attempting to respond the research question, pose the following thought-provoking questions: (i) *What are the key interactions between land-use and transportation activities in theory and;* (ii) *What measurements of those relationships exist that are relevant to the development of integrated policy for land-use and transportation?*

The UN Habitat (2013) found that “most cities in emerging economies and developing countries highly prioritise urban infrastructure and motorised transport development. In this kind of development, accessibility lies at the fundamental of achieving an urban form that is equitable, inclusive, socially and environmentally sustainable, with higher potential to produce economic interfaces that lead to efficiency, income gains and productivity. Sustainable mobility is an “outcome of

how neighbourhoods and cities are designed and take form, but it also outlines the urban form itself". This echoes the powerful, bi-directional association between urban form and mobility, which thus underscores the value of carefully integrating and coordinating land-use and transport planning (UN Habitat, 2013).

Within this context, it is evident that the expansion of new cities present both opportunities and challenges for sustainable city growth (Childers et al., 2014). In addition, Childers et al. (2014), observed worldwide that cities are faced with many developmental challenges including inadequate infrastructure and increasing population, as well as environmental and economic disruptions. Therefore, appreciating the possibilities of improving the ability of policy makers to achieve sustainable management and urban sustainability are thus the pressing needs for the 21st century development (Childers et al., 2014).

Banister (2008), contended that sustainable mobility delivers another paradigm shift to properly investigate the difficulty of cities, and to reinforce the links between transport and land-use. The city is thus the most sustainable urban growth system and it should provide the location of where 70%-80% of the world's population live. The key factors of the "sustainable city are that it should have medium densities, had over 25,000 population of people, having mixed use developments, and that preference is given to developments near to highly public transport accessible interchanges and in the public transport accessible corridors" (Banister, 2008).

The integration of planning and the development of public transport, other modes of transport, and land-use is increasingly recognised as a potentially effective mechanism for achieving long-term public transport goals of functionality and competitive capacity. While integrative approaches can be effective planning strategies for public transport and can increase its attractiveness, the relationship between public transport and land-use planning is particularly important (Hrelja, 2015).

Integrating transport policy with land-use planning is gradually acknowledged as an important strategy for reducing auto use and dependency. Transport and land-use systems are interdependent: land-use patterns affect transport demand and use, while transport systems affect the shape, as well as form of land-use. Yet these two fields of planning and management are rarely strategically integrated within urban management. Decisions around transport investment are often made without consideration of the affect upon land-use patterns and ensuing impact on future transport demand (Minter, 1997).

The location of trip origins and destinations sets the stage for travel. It is evident that where people work, live, socialise and shop determines the time taken, distance of trips and travel costs (UN Habitat, 2013). Travel is not an activity that people wish to undertake for its own sake, but a derived demand. It is perceived that the “only value of the activity at the destination that results in travel”. Therefore, sustainable mobility presents an alternative pattern within which to explore the difficulties of cities, and also to reinforce the associations between transport and land-use (Banister, 2007).

The relationship between locations, as well as impediments and conveniences between them, play a critical role in determining the affluence and suitability of accessing them. This is because the ultimate goal of mobility is the capacity to transverse urban space. In this case, sustainable transportation system starts with the organisation of urban areas in order to reduce the need for mobility. The main objective is to reduce the length of distance travelled and number of trips. Consequently, urban density is optimised and effectiveness of urban spaces is enhanced (UN Habitat, 2013).

Mobility and accessibility are means that enable people to access locations and other people with ease. Efficient and effective mobility reduces the need for transport, minimise travel times and optimises the value of being at the destination. Therefore, improving accessibility puts spatial and human dimensions

at the central of sustainable mobility. In that way, mobility is appropriately regarded as a means to the better end of accessibility (UN Habitat, 2013).

3.2 Bid-rent theory

The Bid-rent is an agent based, as well as spatial competition model, employing exceptional utility curves for willingness to pay and incomes for budget constrained aptitudes to pay for each agent (Clay and Valdez, 2017). The Bid-rent theory was introduced by William Alonso in 1964. Alonso's bid rent theory provides an alternative approach to model "how the demand and price for real estate change as the distance from the central business district (CBD) increases" (Alonso, 1964). The Bid-rent theory suggests that "different land-users contest with one another for land close to the city centre. This theory is founded upon the reasoning that the more accessible an area by customers, the more is profitable" (Alonso, 1964). Alonso's Bid-rent theory appears to be an appropriate and real guideline to model urban land-use. The theory suggests that land market behave as a "bid-auction process" (Martinez, 1992), where the rents are bid upward closer to the city, but lower away from the city centre. Similarly, travel cost is lower near the city centre but higher away from the city centre (Trussell, 2010). The sections that follow provide a detailed theoretical account of the Bid-rent theory.

Cities exist because people compete to live close to their workplaces and other social amenities. Employees prefer shorter travel trips and that is why they compete for land and housing closer to their employment centres. Most cities have their central business areas as their prime locational advantage because of intensively development employment centres. This competition drives up the price of the land in the central business district (CBD). In order to cope with these high land prices, residents opt to live on smaller lots, with high-residential density, to save on transport costs (Moore et al., 2007).

On the other hand, land-users also segregate themselves into concentric rings around the central business district (CBD). Office firms prefer innermost rings while manufacturing firms prefer locations close to the import/export node to reduce the cost of transporting freight. Manufacturers locate themselves in the second ring. Office firms outbid manufacturing firms for land due to highly paid professionals and intensive land-use. Households prefer to locate themselves in the outermost ring because of low travel costs advantages (Moore et al., 2007).

The CBD is usually comprised of diverse mix of land-use, and also has the largest service area. It also serves as the traditional heart of business that includes retail, financial, governmental and civic activities. The CBD function well if it facilitates land-use designs that accommodate the development of a network of activity centres of various sizes and types. The developments should include appropriate mixes of activities and facilities that forms a citywide spatial structure of employment, retail activities, offices, civic uses, transportation facilities, and residential uses (Berke et al., 2006).

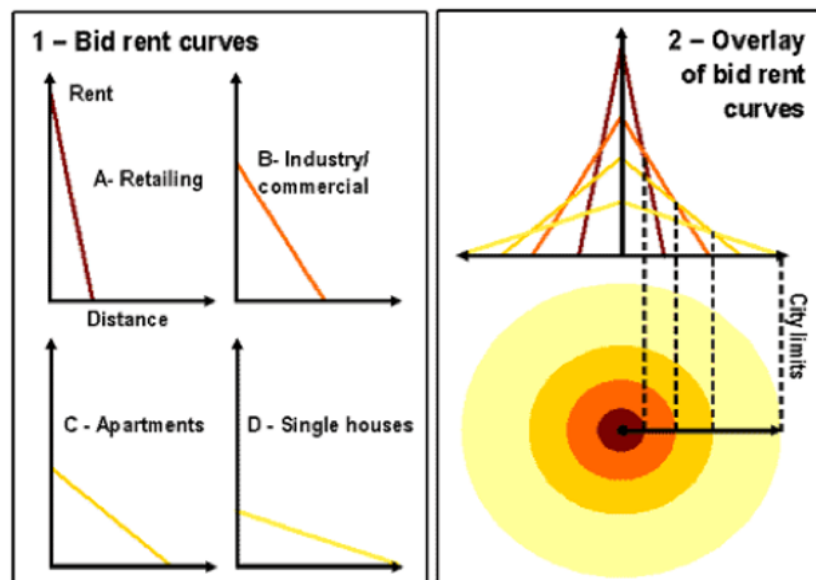


Figure 3.1: Bid-rent curves and its overlay. Source: Rodrigues (2004).

The land-use segregations are best depicted by the Rodrigues 2004 diagram above, called the 'bid-rent curves' of monocentric city (Figure 3.1). In this diagram, 1A indicates retailing concentrated in the central part of the CBD buildings. Industry/commercials are located next in 1B. Workers live mostly beyond the CBD or in the upper stories of CBD buildings as depicted by 1C and 1D (Figure 3.1). Manufacturing firms are mostly located outside of the CBD and often between the residential areas and CBD (Moore et al., 2007).

In the monocentric cities, land values and the intensity of urban development fell with distance from the centre of the CBD. Buildings tend to be taller and closer together toward the city centre, and employment and residential densities correspondingly rose with proximity to the centre. As a result, land price and land density spiked at the centre and dropped with distance from the centre (Moore et al., 2007).

Transport systems are generally developed to lower the costs of transporting people or goods between origins and destinations, and to improve levels of accessibility (Figure 3.2).

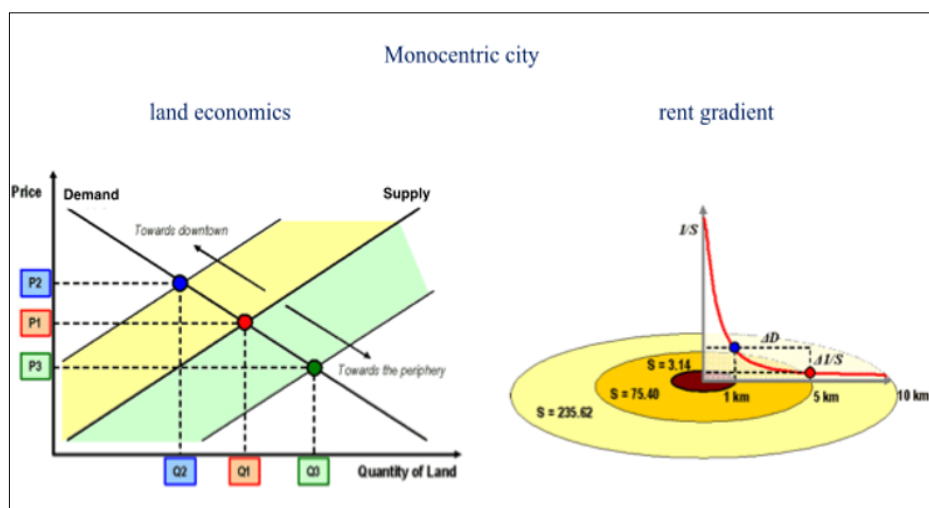


Figure 3.2: Transport infrastructure – land-use distribution relationships. Source: Rodrigues (2004).

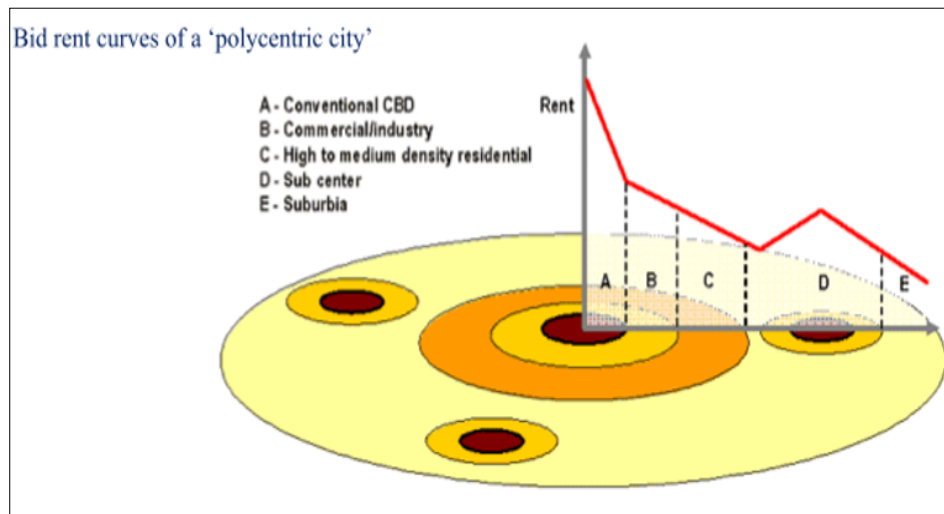


Figure 3.3: Bid-rent curves of a polycentric city. Source: Rodrigues (2004).

In most cases, the CBD is not necessary the most accessible place (Figure 3.3). The rapid expansion of the cities has resulted in most areas being located very “far from the CBD (A), remarkably in suburbia (E)”. The developments necessitated the appearance of sub-centres (D) also having the concentration of commercial, retailing, distribution and industrial activities (Figure 3.3). As a result, “enhancements in telecommunications and transportation have made numerous activities far further tolerant to distance, but still dependent on accessibility”. The urban land-use pattern therefore inclines to be far less concentric/structured (Rodrigues, 2004).

According to the Rodrigues 2004 model (Figure 3.4), transport systems are generally developed to lower the costs of transporting people or goods between origins and destinations, and also to improve the levels of accessibility. The urban land-use/spatial structure and the transport systems have a recursive relationship. The land-use system leads to the changes in the travel patterns, which leads to the changes in the transport system. The transport system in return leads to the changes in the accessibility pattern, which again leads to the changes in the land-use system (Moore et al., 2007).

Many planners at all levels of government understood, conceptually and intuitively, that a transportation/land-use connection existed and should be addressed at all levels of transportation and land-use planning. Many planners lacked information, however, on exactly how that connection worked (directions and magnitudes of causes and effects), how it would be measured, and what the likely impacts would be of policies aimed at influencing it (Moore et al., 2007).

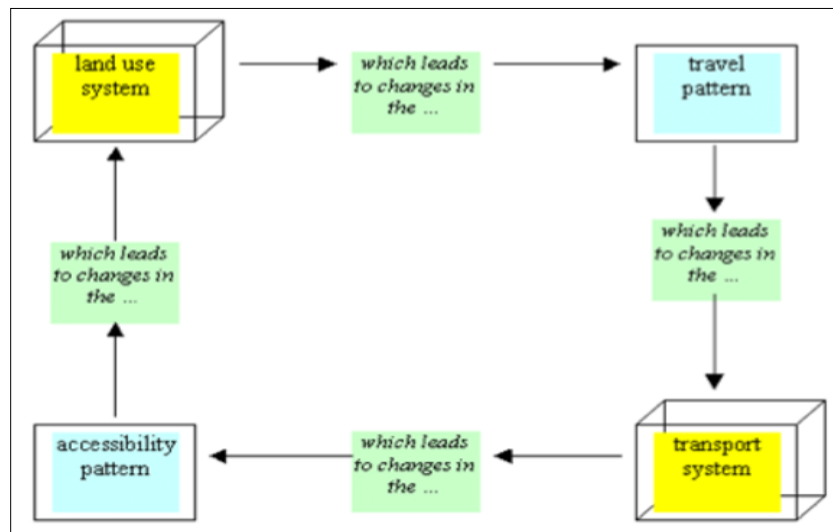


Figure 3.4: Urban land-use and transport systems: a recursive relationship. Source: Behrens (2017).

Land-use changes in response to accessibility requires that new capacity encourages changes in land-use that increase the demand for trips until congestions returns to its prior level to the investment. The changes in the pattern of land development made possible by better roadways, and encouraged by land-use and public facility policies, rapidly increase the demand for trips on those roadways. Whenever the demand pushed against capacity, the solution was to continue funding for construction of increased roadway capacity. Despite the tremendous investments made in roadway capacity, traffic congestion, the chief problem of intra-Metropolitan is virtually ubiquitous. Controlling congestion requires not just changes in transport policies, but probably complementary changes in land-use policies (Moore et al., 2007).

3.3 Relationship between land-use and transport planning

The term land-use planning is often used interchangeably with that of urban planning, town planning, spatial planning and regional planning. The term land-use planning therefore “incorporates the process of managing change in the built and natural environments at different spatial scales to secure sustainable outcomes for communities”. It thus embraces both “spatial elements, such as the physical design and layout of neighbourhoods, cities and regions, together with strategic considerations that take into account of economic, social, environmental and cultural factors” (Ward et al., 2007).

Transport planning, therefore, involves the “management of operation systems and networks designed to simplify the movement of goods and people from one place to another”. It covers multi-modal, motorised and non-motorised movement by road, rail, water and air (Ward et al., 2007).

Land-use and transport planning decisions contribute meaningfully to attractive urban environments. Integration of land-use planning and transport planning is “gradually being recognised as a significant element of making sustainable cities. Therefore, the “integration of land-use and transport is seen as a means to an end rather than an end in itself” (Ward et al., 2007).

The “association between land-use and transport encompasses an important component of models promoting more sustainable urban forms, variously described as compact cities, smart growth and new urbanism. These models are becoming influential in informing land-use policies globally and are seen a means of addressing difficulties for automobile dependence; and associated social, economic and environmental, and impacts” (Ward et al., 2007).

Ward et al. (2007) contended that “urban intensification is unlikely to lead to the attainment of better social and environmental and outcomes”. The likelihood is the increased localised congestion and negative impacts on amenity values. Land-use policies thus requires “mix land-use or increase urban density, without supplementary transport measures to restrict car use and provide alternatives to car use”. Except there are “supporting transport policies, urban intensification may simply bring more cars and people into already congested areas” (Ward et al., 2007).

There is a growing consensus regarding the crucial role of integrated land-use and transport (LUT) policies for sustainable planning outcomes. In the context of LUT approach, some studies recognise an archetype shift from mobility planning to accessibility planning. Accessibility planning is defined as a process of “re-orienting the existing urban structure by focusing development at places with high accessibility in order to support a better public transport system”. Accessibility planning is, therefore, “an important strategy to maximise the environmental sustainability and the quality of life in urban areas and at the same time to make the public transport systems more efficient” (Coppola and Papa, 2013).

Historically, land-use and transport analyses have been strongly linked. Travel is seen as being a derived demand with no intrinsic value. As a result, people travel to achieve the benefits at their destination (Banister, 2008). It is, therefore, important that sustainable transport should be a central consideration whenever new places are developed. Locations (e.g. work, shops and other services) should be located nearer to the people in order to avoid high travel costs and time (Taylor and Sloman, 2011).

Land-use planning is thus important in transport planning and development. In instances where work, shops and other services are located where people live becomes a significant factor in determining and quantifying the number of people and need to travel. It is thus important that sustainable transport is a central deliberation from the early stages of local planning. For instance, whenever retail

areas and new houses are being developed (Taylor and Sloman, 2011). By linking physical transportation infrastructure with the land-use system, the focus on accessibility brings together the land-use system with multiple transport modes. The existing transportation infrastructure can be redefined in terms of the functions it serves, thereby connecting land-use and transportation, and bringing accessibility to the forefront of the plan (Berke et al., 2006).

According to the UN Habitat (2013), the emphasis on accessibility focuses on the need for an integrated and holistic approach to sustainable urban mobility. It institutes a connection between urban form with regard to structure, shape, demographics and function, as well as urban transportation systems. The urban form has the probability to support the amplified proximity of functions and places, which thus minimise the need for extended movement. It is thus clear that land-use planning ensures that there is compactness and proximity of locations, which thus diversifies the functions in order to provide for a variety of needs (UN Habitat, 2013).

It is apparent that cities and transportation are inter-reliant and thus has an effect on each other within a dynamic and complex manner. This is because accessibility benefits provided by transport shape urban environments. Transport is, therefore, regarded as essential, yet hardly, adequate precondition to innovative development. Nevertheless, the association is mutual and works in all the directions. Therefore, the built environments and land-use patterns also shaped the demand for travel by lowering the need for motorised trip making (Cervero, 2009).

The co-dependency of transportation and cities is essential to ensure a sustainable future because of the integration and coordination of transportation and urban development. This is because “people do not just travel for its own sake, but rather to reach places”. It is a fundamental principle of derived-demand. It therefore implies that the manner in which urban activities and physical space are organised, sets the stage for urban trip-making (Cervero, 2009). People want

to travel because their basic activities are separated from where they reside (Berke et al., 2006).

Urban transport systems and city patterns have a natural interdependency. The presence of specific transportation systems changes land accessibility and, therefore, the land value, triggering a change in land-use pattern and city form. Land-use patterns, population densities and socio-economic characteristics influence the choice of transport systems. There are connections amongst urban growth, transport development and land-use planning. Indeed, no sustainable transport system will be successful without acknowledging them (Kenji and Hayashi, 2007).

Transportation and the associated infrastructure are regarded as the key dynamic of urbanisation that constitute the backbone of urban form (UN Habitat, 2013). Transportation infrastructure is also critical to the economic growth and the well-being of cities. The road of most cities was, unfortunately, unsuccessful in keeping up with the increases in traffic. This phenomenon has increased congestion, which thus threatens economic growth, as well as the overall quality of urban living (Cervero, 2009). Notwithstanding the increasing level of urban mobility globally, activities, services and access to places in the cities has become a challenge (UN Habitat, 2013).

The observation by the United Nations (2013) contend that “just like urban form and land-use patterns shape transportation, transportation investments also shape urban form”. It is the changes in accessibility, not the physical infrastructure that drive urban-form and land-use changes, following transportation infrastructure investments (United Nations, 2013). Urban land cover and compactness are additional ways to characterise urban form (United Nations, 2013). However, what ultimately drives development are accessibility gains (Cervero, 2009).

The structure and land-use plans commonly identify the ideal locations and requirements for the use and development of land together with the interactions between land-users and transport systems. Planning and design of movement networks should be an integral part of this level of planning. Therefore, movement networks are particularly pertinent in the valuation of an area's ability to accommodate new urban relief areas and areas of urban development (Transport NSW, 2001).

Public transport is recognised as a potential vehicle for promoting appropriate development and also plays a significant role in land-use patterns and shaping urban growth (Minter, 1997). The mainstay of accessibility based urban mobility in large cities is public transport, predominantly high capacity public transport systems that are well integrated in a multi-nodal planning approach. In order to minimise extended movement and enhance the economies of agglomeration, there is a need to combine mixed-used functions, strong sense of place and high-density settlements (UN Habitat, 2013).

The coordination and integration of land development and urban transport is thus critical in creating sustainable urban areas. The successful integration means creation the connections between urban development and transport work in both directions. Similarly, transportation infrastructure is a vital feature that shapes the city. Integration and coordination of development for spatial and transport planning is thus critical (UN Habitat, 2013).

It is evident that there is a high level of interface between land-use planning and land transport activities decisions. It is apparent that land-use patterns affect access to facilities and destinations, and consequently affect the amount and methods of travel. Therefore, understanding these interactions is important for urban planning (Reisi et al., 2016).

Legacy et al. (2012) indicated that transport and land-use integration is a critical modern transport policy and practice used to deliver sustainable transport. The integration of needs thus requires that land-users are more adjacent and accessible by a full range of transport modes (Legacy et al., 2012). The value of effective transport system within an economic perspective is thus fundamental because it enable and increase mobility of goods and people linked with transportation and economic growth, which thus provide the strength of the wellbeing of the state (Pettersson, 2013).

The sustainable mobility approach thus necessitates the need to decrease travel trips, reduce trip lengths, encourage greater efficiency in the transport system, and also encourage modal shift (Banister, 2008). Therefore, land-use planning and development, as well as land-use legislations and regulations, needs to be integrated. This requires that developmental patterns and physical restraint measures are used to support shorter travel distances. This could improve the levels of proximity, which can assist in reducing the distance travelled, and also contribute to trip reduction, as well as modal split changes (Banister, 2008).

The urban land-use/spatial structure and the transport systems have a recursive relationship (Figure 3.1). The land-use system leads to the changes in the travel patterns, which leads to the changes in the transport system. In this regard, transport system in return leads to the changes in the accessibility pattern, which again leads to the changes in the land-use system. The integration of transport planning and land-use planning is significant for sustainable development. The integration can also assist to reduce rapid growth and detrimental impacts of traffic congestion in most cities (Minter, 1997).

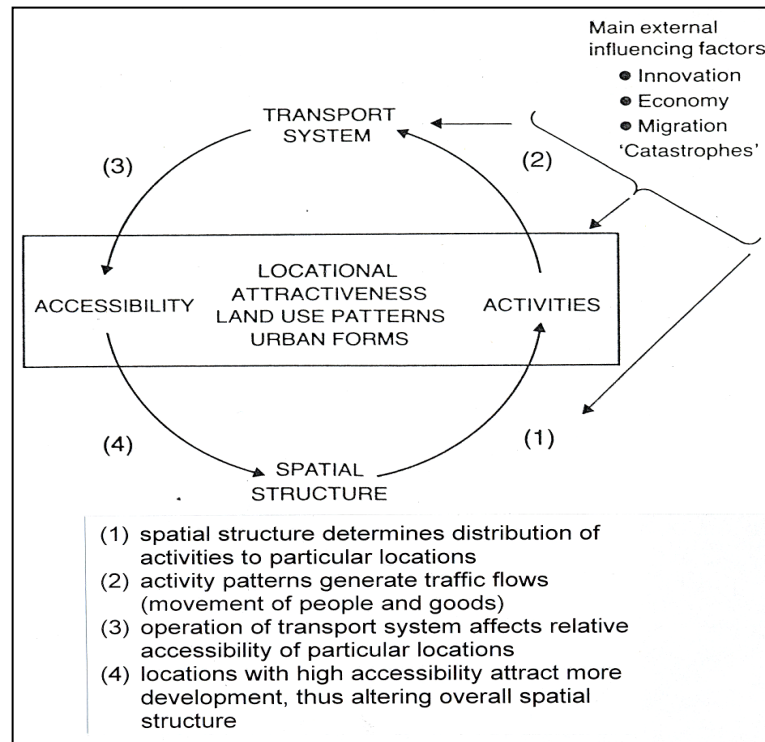


Figure 3.5: Locational attractiveness land-use patterns: Source: Giannopoulos (1994).

3.4 Key elements of integrated land-use and transport planning

There are critical elements that should be in place in order to integrate transport and land-use planning successfully. This is because integrated transport and land-use planning clarifications have a key role to play in ensuring that urban space and other resources are used in a more sustainable manner (Kenji and Hayashi, 2007).

The sustainability plan is one of the important drivers for achieving policy integration, including environmental social and economic issues. Within this context, sustainability surpasses the capabilities of transport and land-use planners at the key decision-making stages of their integration. Sustainable transport and land-use planning requires integration and coordination, both across departments and all levels of government and entities (Hull, 2005).

One of the key element is to forge a coordinated approach to the execution of structure plans in integrating land-use planning with transport planning. Those structure plans should clearly be able to identify the person/institution responsible for implementation, duration of the project, and risk mitigation strategies (Banister, 2008).

The availability of requisite and diverse skills in terms of effective planning and management is very key. It has been found that lack of coordination and capacity for strategic planning is a key challenge in many cities of the worldwide, predominantly in the developing countries. Organisations seldom have enough funds or time to expand transport infrastructure fast enough to accommodate travel demands (UN Habitat, 2013). According to Kumar and Agarwal (2013), land-use and transport planning requires good working relations amongst institutions and also varied technical skills to execute the plan successfully. Thus, land-use and transport planning cannot be considered in isolation, but rather need to be scrutinised as part of an integrated approach in collaboration and coordination with other government plans. There is also a need for an integrated coordination between different spheres or levels of government or agencies so as to create better and appropriate institutional structures for such coordination (Kumar and Agarwal, 2013).

Transport and land-use planning seems to be subjective to public policy. Government departments or institutions must, by choice or by force, consider a long- term development pattern to do their transport and land-use planning. Tying transport and land-use planning processes into policy is the simplest way to the coordination and planning of transport and land-use functions across all government levels (Moore et al., 2007).

Translating visions and policies for sustainable transport and land-use planning is thus dependent on the existence of supportive and nurturing governance, as well as better regulatory frameworks and institutional structures. Inadequate institutional capacity poses immense challenges in advancing sustainable transport and land-use planning (UN Habitat, 2013).

The study conducted by the UN Habitat (2013) showed that the amalgamation of strong sense of place, mixed-used functions and high-density settlements not only reduces the necessity for extended movement, but also further enhances non-motorised mobility and economies of agglomeration. Furthermore, appropriate layout of streets, design and neighbourhoods, as well as proper streamlined arrangement of roads, including arterial streets, should likewise be taken into consideration (UN Habitat, 2013).

There is a need to foster an organic integration of different modes of transport within sustainable land-use system to promote interconnections and optimise functionality. Therefore, transport and land-use planning processes need to be coordinated and integrated both at policy and operational level. This could shift the focus of planning to enable the realisation of people's desires and everyday functions in the most sustainable and resourceful manner (UN Habitat, 2013).

In order to have more impact, public and non-motorised transport interventions should be prioritised to prevent negative outcomes. The need for private cars can be reduced by prioritising public and non-motorised transport, as well as through providing high levels of innovative services. In order to successfully reduce private transport, there is a need for effective land-use and transport plan to encourage sustainability forms of mobility and change public attitudes towards public transport (UN Habitat, 2013).

History shows that public transport systems like urban rail systems, Metros, light rails, BRTs, etc. are possible city shapers. Public transport system play a role in determining the growth of the city, attract businesses and offices along public transport corridors. It further lead to high concentrations of industries. Travel demand can be managed effectively by matching location with relevant public transport system in achieving the goals of maximising transport choice. Effective planning for a novel public transport infrastructure need to be incorporated into regional land-use and corridor strategies. Proper planning for new development has the potential to create employment, housing development and densities, as well as other factors that maximise infrastructure development (Transport NSW, 2001).

Spatial planning is regarded as an enabler to sustainable travel because it plays an essential role in enabling or inhibiting a specific types of travel (Hickman et al., 2009). As a result, integrated urban growth and mobility planning need to happen at local, provincial and national spheres of government. It is apparent that proper spatial coordination at local, provincial and national levels is central for the successful integration of urban and transportation development (UN Habitat, 2013).

Transport NSW (2001) indicated that new planning for public transport services need to be carefully aligned with corridor development, new development projects and land-use planning. Specifically, services need to facilitate access to centres in major corridors and transport nodes. This could ensure that concentrations of activities and centres are located along major public transport corridors. This move has the potential to promote better public transport services, encourage more origins, as well as destinations, and also make public transport attractive (Transport NSW, 2001).

The benefits of integrating transport and land-use planning includes reduced transport demands, lower costs due to shift toward shorter trips and more walking, low energy consumption due to shifts in length and modes, improved air quality and expanded accessibility (Litman, 2009). Banister (2007) contended that intervention can take place through mixed use development, housing location and by increasing densities, as well as concentration. Intervention can also takes place through the design of buildings, space and route layouts. Furthermore, intervention can be through transport development areas, public transport oriented development, car-free development, as well as through ensuring that services and facilities are available (Banister, 2007).

Local government are vital role players for successful integration of land-use and public transport planning, particularly in countries having a decentralised land-use planning setting. The planning of land-use and transport need to be integrated in a manner that allows new urban development to take place in locations which are suitable and good for public transport (Hrelja, 2015). Urban forms should prioritise public transport networks through the amalgamation of vibrant planning strategies. The use of cars will not be eliminated completely but the objective is to design high quality cities and efficient public transport systems (Banister, 2007).

3.5 Barriers to successful integration of land-use and transport planning

Many planners at all government spheres understand that there is a relationship between transport and land-use planning. Their problem is inadequate information on how transport and land-use planning connection work, how it would be measured, and what the likely impacts would be of policies aimed at influencing it (Moore et al., 2007).

There are many reasons why the integration of transport and land-use planning has not progressed fast as expected. The main reason being that it requires many institutions and stakeholders with different mandates and values. Land-use and transport planning are normally not managed from the same institutions. They are

normally managed from different departments, i.e. at local, provincial and national levels of government. Non-institutional stakeholders include communities, private sectors, lobby groups, etc. These stakeholders have different mandates, values and priorities. Consultations with different stakeholders is key if integration of transport and land-use planning is to be realised. The sheer complexity of the issues and interdependencies are also very high (Waddell, 2011).

Different authority levels and jurisdictions governing transportation and land-use planning intensify the difficulty in coordination of the two functions. In most institutions, transport plans are regularly drawn at the provincial and national levels while land-use plans are drawn at the municipal level. As a result, provincial and national transport plans and policies often conflict with local land-use plans and policies. These separate geographies create additional obvious conflict, further undermining the coordination among transport and land-use planning (Berke et al., 2006). In general, different levels of government are not legally required to coordinate their planning activities. Even when the planning activities are related and located in different institutions, coordination is lacking among different departments and government public entities. Sometimes individual agencies operate like independent authorities and do not coordinate their activities with their 'sister' agencies or departments (Litman, 2009).

Hull (2005) is of the opinion that shortfalls in the implementation of transport and land-use planning are mainly as a result of divergent agendas, lack of integration, as well as lack of 'fit' between different disciplinary and administrative policy areas, such as transportation planning, sustainability planning and land-use planning. By and large, administratively "integration can be considered along the horizontal sector integration of public policies and their delivery by a number of public and private organisations, and vertical inter-governmental integration of policies between the tiers of government" (Hull, 2005).

Land-use changes in response to accessibility. New roads increase demand for trips until congestion returns to its prior level to the investment. Whenever demand pushed against capacity, the tendency is to build more roads. Despite huge investments in roads construction, traffic congestion continues to increase. This is because controlling congestion requires changes in both transport and land-use planning policies (Moore et al., 2007). Transport and land-use planning, as noted above, have tended to be separate tasks. This is because transport plans either strengthen past development patterns or inspire development in locations and ways not provided for in the land-use plan. Land-use planning, for its part, often ignores the effects that large transportation investments can have on land development. In other cases, the land plans accept much of the transport plans as outside inputs, rather than as a plan portion to be coordinated and developed jointly with land-use (Berke et al., 2006).

Across cities of the world, the equation of 'mobility' with "transportation" has led to a tendency towards increasing motorisation, and a propensity to expand the network of urban roads. The highway structures, including flyovers and viaducts, as well as foot-bridges and tunnels, have become standard characteristics of the modern city and urban landscape. Therefore, encouraging this whole developmental processes is the excessive sectorisation of transportation planning and management. This suggests that apart from causing a spiral of negative externalities, this approach also distorts the urban form and severely undermines the economic, environmental and social sustainability of cities. The main missing linkage is that sustainable mobility involves and necessitates a closer links between land-use and transport planning (UN Habitat, 2013).

Some economic policies play a role in increasing car usage because they uphold planning practices and fuel subsidies that incentivize large malls with retail centres and extensive parking, as well as suburban residential development. The suburban development that supports car culture normally allow people to resides in low density residential areas because of cheaper land prices. As a result, they commute over long distances. The choice for planning thus ensured that the car

became an important part of most people's transportation requirements. The inadequate connection between transportation and land-use planning has stimulated the propensity towards improved transport investments. The aforementioned can deliver instant visible infrastructural outputs, leading to direct outcomes and impacts, and thus benefit a variety of interests, as well as high political pay-off within a short period (UN Habitat, 2013).

A persisting challenge between transport and land-use planning is the application of integrated transport and land-use planning in practice. Another challenge relates to existing transport infrastructure and land-use patterns that cannot always be simply changed, predominantly in old, middle-size and larger cities (UN Habitat, 2013). It is contended that the best way of addressing the issue of integration is to define the different levels by which integration could be realised either at the local, regional or national spheres (Hull, 2005). The integration of development and planning of public transport, land-use and other modes of transport is progressively recognised as a possibly effective mechanism for attaining long-term public transport goals of functionality and competitive ability. Though integrative approaches can be a sound planning strategies for public transport and can increases its attractiveness, the relationship between land-use and public transport planning is principally significant (Hrelja, 2015).

3.6 City-wide public transport network

People are encouraged to travel because of the availability of effective public transport mode and its performance, mainly in terms of comfort, fare, as well as congestion level. They also take into account the purpose of their trip and socio-economic features (Lo et al., 2008). Travellers prefer effective and efficient public transport system that simplifies seamless movement within and among cities, which in turn is important for prosperity and urban functionality. The light rail, Metros and Bus Rapid Transits (BRTs) are, therefore, appropriate for key corridors in cities and as part of effective integrated public transport systems (UN Habitat, 2013).

The high capacity public transport systems are essential in influencing urban form, mixed and accessible land-use and further promote higher densities. These plans and strategies decrease the necessity for trips by private motorised travel and could, therefore, decrease the kilometres travelled by either motorcycles or cars. This could also mitigate negative externalities such as traffic congestion, air pollution, road accidents and noise (UN Habitat, 2013). Normally, cities that highly invest in city-wide public transport turn to succeed in shifting trips from cars to public transport. Therefore, the quality and distance to public transport have major impacts on travel patterns. The type of public transport infrastructure is thus a significant determinant on travel behaviour. It is thus apparent that fixed way systems have better waiting and travelling environments, relative immunity and higher visibility and status to traffic congestion (Taylor and Sloman, 2011).

The BRT, light rail and Metro are all intended to provide comfortable, fast and cost-effective urban mobility in medium to high demand corridors. This implies that these modes of public transport, which use explicit fixed or exclusive and separated tracks, have superior operating capacity and performance compared to unsegregated road-based transport such as taxis, paratransit and buses (UN Habitat, 2013). The introduction of BRT, Metro and light rail can produce significant benefits to the city. It can further improve the effectiveness of the urban economy by reducing travel time and cost. It can further reduce road congestion, increase the level of city-centre activity, increase environmental and economic benefits, enhance agglomeration of economies, which are crucial for the prosperity of urban areas (UN Habitat, 2013).

Taylor and Sloman (2011) argued that transport and land-use planning integration need to be accomplished by basically recognising the process of developmental planning. This implies that public transport need to be physically centred at the heart of developments, however it must also take into account the interaction between public transport and development, as well as the quality of the public transport. This requires that new developments are centred on high quality public

transport that offers rapid linkages to the nearest major centre of major urban facilities and employment (Taylor and Sloman, 2011).

High level of accessibility on mass public transport system need to be accredited to numerous factors such as high-density township and land-use policies that encourage compact development. Other factors include “transport policies that prioritised development of mass public transport facilities and additional government actions that ensures financial feasibility of privately provided Public Transport Strategy (PTS), particularly the innovative model for integrating development of transport facilities and property so as to exploit their synergy” (Lo et al., 2008). Public transport facilities are central assets to any major city. They enhance accessibility and mobility while at the same time reducing car dependence, hence the need for highway expansion, growth and development. For public transport services to be alternative to private cars and attractive, their performance in terms of travel time, waiting time, point-to-point connectivity, and transfer time must be satisfactory to the public (Lo et al., 2008).

3.7 Mechanism to integrate land-use and transport planning

The public turn to be attracted to destinations having good amenities and access to public transport networks including well-designed urban spaces that are walkable and convenient to work, learn, interact, play and live. The integration of transport and land-use planning reduces the necessity for travel by car and create urban forms and spaces that facilitate that accessibility (Suzuki et al., 2013). In urban areas in particular, the ability of people to move within cities to access services, amenities and jobs is a significant driver for sustainable growth. Access to affordable, safe and environmentally friendly public transport network is a precondition for the welfare of urban dwellers, balanced functioning, as well as prosperity of cities (UN Habitat, 2013).

Factors that are involved in the mechanisms for successfully integrating transport and land-use planning include: inherent characteristics of a city, institutional settings, public sector initiatives and governance structures actions. Travel demand is also affected by the features of land, including degree of land-use mixing, residential and job densities (Suzuki et al., 2013). Land-use planning at the local, provincial and national spheres should lead the decisions regarding city-wide public transport infrastructure investments. Such leadership may require an independent land-use authority at local level, with the powers to create and enforce a city-wide land-use and transport integrated plan. The plan would be guided by the provincial and national political process and then implemented by the local sphere of government, including the land-development agencies in the local levels (Cervero, 2006).

City-wide public transport network and land-use integration plans are very important and long-term in nature. They need more capital and operational funding in order to implement them successfully. Public transport and land-use integration has the potential to increase the revenue required to support and expedite the crucial processes. There is infrastructure financing concept called value capture that seeks to capture land value as created by new infrastructure, specifically public transport network. Value capture is thus effective not only for sustainable finance, but also for sustainable urbanism. Therefore, value capture is predominantly well suited for financing public transport infrastructure in congested settings and dense areas, where a high premium is placed on accessibility. The value capture schemes success therefore depends to a substantial degree on a supportive institutional environment (Suzuki et al., 2013).

In addressing the interface between transport and land-use planning, decisions regarding modes and locations of facilities that shape growth in the desired way from transport investment need to be made. This implies that land-use policies that are consistent with transport investments need to be taken into consideration (Litman, 2009). In some cases, economic and political competition within and

amongst municipalities regularly impedes on service delivery across administrative boundaries and the coordination of planning investment (Suzuki et al., 2013).

It is apparent that high density development necessitate the need for increased level of infrastructure investments. However, such investment should not essentially lead to the deterioration of urban service provision. This undesirable perception of high average urban population density leads to city planners and policy makers to be reluctant to ramp-up urban density by allowing a higher floor area ratio. They incline to “apply either a uniform or too narrow a band of ratios across all city areas, without capitalising on location premiums, such as proximity to public transport stations or corridors”. Controlling density without taking into account the land’s economic value limits cities from successfully managing their land-use (Suzuki et al., 2013).

Most public transport investments in cities exist in already urbanised areas primarily because the priority is to address the existing unmet traffic demand and decrease congestion. Retrofitting built-up zones is difficult because households and private businesses own the majority of properties and the state has limited control over land. The revitalisation of “build-up” zones necessitates the need for demolition of assets to secure the right of way and the funds for construction. Such needs social and economic and social implications because redevelopment requires resettlement arrangements and substantial costs (Suzuki et al., 2013).

It needs to be clarified that land-use patterns influence travel demand, while public transport shapes urban development. Land-use variables therefore not only reflect trip interchange features, but also the attributes of the origins and destinations. The inadequate urban design features create a delink between the surrounding neighbourhoods and the public transport system. The inadequate integration does not promote the reconfiguration of the city layout along the public transport corridors in a way that fosters vibrant economic activities and urban life (Suzuki et al., 2013).

The greatest obstacle to integrate transport and land-use is the huge upfront capital investment required to develop city-wide public transport network. This kind of challenge is difficult to overcome due to urban growth, which has put pressure on the ability of local government to provide urban services and infrastructure. Subsidies are sometimes needed at the operational stage to make up functional deficits or to provide vouchers for low-income. Limited funds also sometimes oblige transportation companies to select routes based on the cost of “right-of-way” acquisition rather than on the “long-term” development prosperity of areas that need to be served. In such cases, system design is driven mainly by the desire to lessen construction costs. In this instance, opportunities to maximise development are forgone (Suzuki et al., 2013).

3.8 Summary

There is growing appreciation, as also demonstrated by the Bid-rent theory, that the integration of transport and land-use planning is essential to safeguard the efficiency of urban mobility systems. The matter is not so much the variance in viewpoint, but somehow the influence and power that accompanies these viewpoints and their aptitude to affect outcomes. There is, nonetheless, an increased consideration of the close relations between land-use and urban mobility planning as a result of the “land-value” impact on transport infrastructure on land-use. The different institutional arrangements have both strengths and weaknesses. Provincial government departments have responsibilities towards a larger jurisdiction, typically several cities, within the province. In addition, government decision-making processes tend to be very tedious and slow, which delay progress on transport and land-use planning implementation.

It is concluded that the chapter was able to answer a key research question on why it is necessary, from a theoretical perspective, to integrate transport and land-use planning. It has been acknowledged that there are numerous functions that need to be accomplished to ensure that an integrated transport and land-use function in a city. Therefore, instituting a lead institution to take comprehensive

obligations for land-use and transport planning appears to be a best model for urban development (Kumar and Agarwal, 2013). This is primarily relevant in rapid growing cities that necessitate multimodal systems of transport. However, smaller cities might not immediately need such a lead institution, but if predictions indicate they will grow fast in the future, it would be significant to establish a lead agency at an early stage of transport and land-use planning. Lead agencies can be set-up as an autonomous body or institutions at local, provincial and national sphere of government. The next chapter reviews and discusses the South African legislative and policy framework with regard to the integration of transport and land-use planning.

CHAPTER 4: SOUTH AFRICAN LEGISLATIVE AND POLICY FRAMEWORK

4.1 Introduction

The first democratic government elections in South Africa took place on the 27th of April 1994. The new democratic government commenced with the transformation from a racial country to a non-sexist, non-racial, united South Africa. The Constitution (Act 106, 1996) was adopted, which divided South African into nine provinces namely, Gauteng, Limpopo, Western Cape, North West, Eastern Cape, Northern Cape, Kwazulu-Natal, Free State and Mpumalanga. Before elections, South Africa was divided into four areas: Natal, Transvaal, Cape Province and Orange Free State.

The transformation of South Africa also took place at the local government level, starting with transitional arrangements from 1995. In accordance with the South African Local Government Association (SALGA), “this process occurred mainly in three phases: (a) The first phase or pre-interim started with the coming into operation of the Local Government Transition Act 209 of 1993 (LGTA), and the establishment of the negotiating forums in local authorities pending the first local government election; (b) The second phase began when the first local government elections were held in 1995/1996, establishing integrated municipalities although these were not yet fully democratically elected; (c) The third phase commenced with the local government election on 5 December 2000, establishing the current municipalities”. Sustaining the change processes were the provisional and final Constitution of 1993 and 1996, respectively (www.salga.org.za).

The Constitution makes provisions for three categories of municipalities. South Africa has 278 municipalities, comprised of eight (8) Metropolitan, 44 districts, and 226 local municipalities. The formation of the municipalities in terms with the requirements relating to categories and types of municipality was further provided for by the Local Government Municipal Structures Act (1998).

The Municipal Structures Act (1998) was followed by the promulgation of the Municipal System Act (No. 32 of 2000). The main aim of the Act is to provide for the processes, mechanisms and core principles that are essential to enable municipalities to move gradually towards the economic and social upliftment of local communities.

This chapter has, therefore, reviewed and discussed the current South African legislation and policy framework as far as land-use and transport planning are concerned. The chapter answers a key research question on *“what does the South African legislation and policy framework stipulate with respect to the integration of land-use and transport planning, and how effective has this been in practice”*.

4.2 Land-Use planning legislative framework

The transformation of local government started with the promulgation of the Local Government Transition Act (No. 209 of 1993). The aim of the Act was to “provide for the revised interim measures with a view to promote the restructuring of local government, and for that purpose to provide for the establishment of Provincial Committees for Local Government in respect of various provinces”. The main objective of the Act was to define the duties and powers of the Local Government Coordinating Committee.

In accordance with the Local Government Transition Act, the Metropolitan Councils were expected to: (a) “formulate and implement a Metropolitan integrated development plan, incorporating Metropolitan transport planning, land-use planning, infrastructure planning and the promotion of integrated economic development”; (b) the “co-ordination and monitoring of local integrated development plans”; (c) the “provision and regulation of passenger transport services”; (d) the “co-ordination of passenger transport services after consultation with the Metropolitan Local Council”; and (e) “traffic law enforcement, if so requested by the Metropolitan Council concerned”.

The rearrangement of local government was further accelerated with the establishment of the Municipal Demarcation Board. The function of the Board is to determine the municipal boundaries in terms of Local Government Transition Act, as well as other relevant legislation, passed in terms of Chapter 7 of the Constitution.

The Municipal Demarcation Act (No. 27 of 1998), states that when the Demarcation Board determine a municipal boundary, its objective must be to establish area that would: (a) enable integrated development; (b) promote the necessity for cohesive, unfragmented and integrated areas, as well as Metropolitan areas; (c) take into account existing and expected land-use, economic, social and transport planning; and (d) promote the need for synchronised local, provincial and national programmes.

In terms of the Municipal Structures Act (No. of 1998), the “planning undertaken by a municipality must be aligned with developmental plans and strategies of other affected municipalities, and other organs of state so as to give effect to the principles of co-operative government as contained in section 41 of the Constitution”. The Act further prescribes that “municipalities must participate in provincial and national programmes in accordance with section 153 (b) of the Constitution.

The Municipal Systems Act (No. 32 of 2000) prescribes the core components of integrated development plan, which should include a spatial development framework. The “spatial development framework must include the provision of basic guidelines for a land-use management system for the municipality”. This framework binds both the local and district municipalities. The Municipal Systems Act outline the status of integrated “development plan as follows the principal strategic planning instrument, which guides and informs all planning and development, and all decisions with regard to development, planning and management in the municipality” (Municipal Systems Act, 2000).

The Spatial Development Frameworks were followed by the proclamation of the Spatial Planning and Land Use Management Act (SPLUMA) (No.: 16 of 2013). The Act requires that there should be coordination, monitoring, and review of the land-use management system and spatial planning. It also outlined the principles, norms, standards and policies for land-use management and spatial development planning. The Act also addresses past regulatory imbalances related to spatial planning. It further promotes greater uniformity and consistency in the application of procedures and decision-making by authorities responsible for land-use development applications. The Act further requires that the Municipal Planning Tribunals should be established, functional and operational. The need for the facilitation and enforcement of land-use and development measures, as well as other matters, related to land-use and spatial planning is also critical (Spatial Planning and Land Use Management Act, 2013).

In terms of the Spatial Planning and Land Use Management Act (SPLUMA), spatial planning is divided into the following categories: municipal planning, provincial planning and national planning. Each category defines what plans must be developed, prescribed by which legislation, and other land-use regulatory measures. The universal principles set-out in SPLUMA apply to all state organs and other entities responsible for the execution of legislation regulating land-use and development (Spatial Planning and Land Use Management Act, 2013).

4.3 Land-use policy framework

The NDP 2030 indicates that in order to realise an innovative balance between environmental sustainability, spatial equity and economic competitiveness, it is necessary for major development of city-regions that extend beyond individual municipalities. The coordination of development initiatives and land-use management decision-making in particular are greatly affected by the blurring boundaries. Therefore, the institutional structures that guarantee greater harmonisation and collaboration of plans must be considered (National Planning Commission, 2012).

According to the NDP report, transportation network systems are thus significant to the spatial conversion of urban areas. While there has been development in certain cities in delivering new public transport infrastructure, the “major shift from supporting private cars to incentivising public transport is yet to happen”. This is due to insufficient attention, which has been given to integrating modes of transport and coordination across municipalities (National Planning Commission, 2012).

4.4 Transport planning legislative frameworks

The Department of Transport embarked on a process to revisit and review transport policy during the early 1995. All role players and the public at large were involved in policy making process, identification of policy issues, gaps and options, as well as discussing and accepting policy proposals. This process culminated to the adoption of the White Paper on National Transport Policy (1996) by the Department of Transport (White Paper on National Transport Policy, 1996).

The White Paper recognised that transport development and land-use are not integrated due to a disintegration of responsibilities for the planning, administration and regulation of the numerous features of land-use, operations, infrastructure and regulations. The fragmentation of roles coupled with the legacy of apartheid legislation have led to spatially dislocated settlements, low density development, as well as urban sprawl; resulting in incredibly long commuting times and distances, high costs for transport, low-cost recovery and low occupancy levels (White Paper on National Transport Policy, 1996).

The White Paper also indicated the following spatial development principles, which thus support passenger transport policy: (a) Land-use development proposals must be subject to a land-use/transport policy framework within an agreed development planning process; (b) the effective functioning of cities and industrial areas must be enhanced through integrated planning of land-use, transport

infrastructure, transport operations, as well as bulk services (White Paper on National Transport Policy, 1996).

The White Paper identified policy actions that are essential to provide for urban reform and efficient land-use, as well as transport interaction, which should be promoted by the state. This included: (a) land-use guidelines, framework and policies to channel development, particularly employment creation into the public transport corridors and nodes; (b) establishment of structures at all levels of government, which facilitate integrated planning of operations, land-use and infrastructure in a coordinated way; (c) regulation of land-use development at local levels so that development approval is subject to conformity with integrated land-use, as well as transport plans (White Paper on National Transport Policy, 1996).

The White Paper on Transport was followed by the launch of 'Moving South Africa,' a 20-year strategic agenda to "deliver on the vision set for the transport system in South Africa". The Moving South Africa (MSA) is "focused on the effective execution of integrating transport plans with urban land-use plans to safeguard that public transport corridors reinforce high density mixed land-use corridors and become an significant instrument to reintegrate urban areas" (White Paper on National Transport Policy, 1996).

The processes of the 'Moving South Africa' and 'White Paper on Transport' culminated in the promulgation of the National Land Transport Transition Act (No. 22 of 2000) to provide for the transformation and restructuring of the national land transport system of South Africa. The main aim of the Act was the coordination and promotion of institutional functions in land transport and also that land transport responsibilities need to be incorporated with related functions such as economic development, land-use and planning, development of corridors, densification and infilling (National Land Transport Transition Act, 2000).

The National Land Transport Transition Act made provision for the “creation of Transport Authorities in order to advance the delivery of transport services at the municipal sphere of government through the assemblage of transport functions into a single, well-managed and focussed institutional structure”. In terms of the Act, the Transport Authority is a juristic person that is distinct from the functions of the municipality. Furthermore, “Transport Authority is governed and controlled by the governing body appointed for it in terms of the agreement, which must consist solely of councillors of the constituent municipality or municipalities, the number of which is determined in the founding agreement” (National Land Transport Transition Act, 2000).

The National Land Transport Transition Act (2000) further prescribed principles for transport planning and its association with land development. The Act also provide the need for integration of land development processes and transport plans together with land transport planning. In terms of the Act, transport plans need to be developed in order to improve the proper functioning of rural areas, towns and cities. This could be realised through integrated planning of transport operations such as public transport services, freight movement, as well as bulk services, together with transport infrastructure and facilities (National Land Transport Transition Act, 2000). These integrated plans and developments need to be in accordance with section 27 of the Development Facilitation Act (1995) or the relevant provincial legislation. The transport plans must also take into consideration the direct mixed land-uses, high-density residential development and employment opportunities into high utilisation public transport corridors, unified through development nodes within the corridors, and also dejects urban sprawl, where public transport services are insufficient (National Land Transport Transition Act, 2000).

These processes led to the promulgation of the National Land Transport Act (No. 5 of 2009). The Act was passed to provide further the process of restructuring and transformational agenda of the national land transport system, which were initiated by the National Land Transport Act (2000). The purpose of the National Land

Transport Act (2009) is to prescribe the national requirements, frameworks, guidelines, norms, standards and principles that provinces should apply for consistency and standardised development across the country. It further provide for the consolidation of land transport functions and also locate them in the relevant level of government. The National Land Transport Act (2009) outlines the functions of different levels of government and how they must relate and integrate with each other. The provisions of this Act apply throughout the Republic of South Africa. The Act also recognises the Minister as the Executing Authority at National Level and Member of the Executive Authority (MEC) as the Executive Authority at the Provincial Level (National Land Transport Transition Act, 2009).

According to the National Land Transport Act (2009), the function of the Minister of Transport is to promote an integrated and strategic approach towards the delivery of public transport, and also to encourage effective integrated transport planning. The Member of the Executive Councils (MECs), at the provincial levels, must ensure that there is proper link of developmental issues, which have an impact on transport planning and operations in the province so as to facilitate integration and efficient transport. These issues include environmental management, land-use management, infrastructure investment, population growth and economic development. For instance, the Act gave the local level of government the responsibility to develop land transport strategy and policy within its jurisdiction and also ensures that there is proper coordination between departments and agencies in the municipal sphere with mandates that impact on land-use and transport planning matters. The functions also include the “planning, implementation and management of modally integrated public transport networks and travel corridors for transport within the municipal area and liaising in that regard with neighbouring municipalities” (National Land Transport Transition Act, 2009).

The National Land Transport Transition Act (2009) also provides for the universal principles for transport planning and its integration with land-use, as well as development planning. The general principle within the Act is that land

development and land-use planning processes must be integrated with land transport planning. The “integrated transport plans required by this Act are designed to give structure to the function of municipal planning mentioned in Part B of Schedule 4 to the Constitution, and need to be considered as an important part of integrated development plans, with due regard to legislation applicable to local government, and also its integrated transport plan need to be a transport component of the integrated development plan of the municipality” (National Land Transport Transition Act, 2009).

4.5 Transport planning policy framework

The South African government approved the Public Transport Strategy (PTS) in January 2007, followed by the Public Transport Strategy Action Plan (PTSAP) in March 2007. The PTS main responsibilities are Integrated Rapid Public Transport Networks (IPTNs) and accelerated modal upgrading. The Modal upgrading refers to “the current enterprises to transform taxi, bus and rail services delivery in the short-medium term”. The Integrated Rapid Public Transport Networks relates to the upcoming PTSAP’s emphasis on the implementation of high quality phase 1 networks of rail priority corridors, as well as bus rapid transit corridors, in the Metro cities (Public Transport Strategy, 2007).

The PTS 2020 vision is to “develop a system that places over 85% of a Metropolitan city’s population within 1km of an Integrated Rapid Public Transport Network trunk (road and rail) or feeder (road) corridor”. Metropolitan cities are thus expected that by 2020 they should have achieve a mode shift of 20% of car work trips to public transport networks. The PTS therefore recognises that a prioritised Network should serve as a basis for anchoring land-use development so as to maximise Network utilisation, as well as to minimise travel time and distance. The Network should allow municipalities to be far more proactive with respect to regulating and channelling land-use in a manner that integrates with the Network (Public Transport Strategy, 2007).

In terms of improving institutional arrangements, the PTS advocates for the engagement with the Department of Cooperative Governance and Traditional Affairs, Department of Human Settlements, Department of Rural Development and Land Reform, Municipalities and Provinces in order to strengthen inter-departmental coordination with respect to land-use, transport and housing integration. There is also a need to fast-track the identification of priority local transport corridors and related location of medium density land-use. The PTS provided a need for alignment of land-use planning with public travel demand, transport network and non-motorised transport planning (Public Transport Strategy, 2007).

Good working relationships and better coordination need to be forged among local, provincial and national government to successfully implement the PTS. The Minister of Transport and the provincial and municipal counterparts need to aggressively champion the delivery of the proposed improvement measures for the land passenger transport sector. The Minister of Transport should request Provincial and Municipal counterparts to translate the strategy into Action Plans that clearly set-out how Public Transport Strategy will be implemented over the next decade of transformation. Achieving the legacy requires that a municipality should act as a network authority that acquires the required public transport infrastructure, good pedestrian and bicycle access, good park and ride facilities for car users, good dedicated road space, dignified public space, and high-quality stations, interchanges, stops, depots and terminals and (Public Transport Strategy, 2007).

The PTSAP recognised the following key institutional driven factors that must be in place in order to implement the Integrated Rapid Public Transport Networks successfully: (a) accountability; (b) effective integration of land-use and transport plans; (c) sound integration of public transport modes; (d) competitive business model for the public transport, (e) security, safety and enforcement of legislation; (f) pro-active and regular maintenance; (g) predictable, sufficient and reliable

financial streams; and (h) attracting and retention of skilled personnel (Public Transport Strategy, 2007).

The National Development Plan (NDP), 2030 advocates for governmental policy that devolves transport management to local sphere of government in order to align the disjointed and contradictory interests of numerous transport authorities, each with distinct funding sources and mandates. The NDP report caution that care should be taken when dispensing responsibility for transport over to municipalities. The delegation of the transport function could be successful if it is complemented by the reinforcement of institutions, as well as alignment of practice, policy and legislation (National Planning Commission, 2012).

The NDP 2030 report indicates that transport planning should be governed by central government to assist with the formulation of credible long-term plans for transport plans that harmonises with spatial plans. This implies that transport plans need to be aligned with the investment in infrastructure at the local and provincial spheres of government. The plan need to clearly evidently communicate the state of transport vision to the private sector. Using the urban form as a guide, the emphasis need to be on achieving the mutually strengthening effect of public transport network-led growth. This could help increases the concentration in urban settlement, whereas at the same time improves the economies of scale for transport modes (National Planning Commission, 2012).

4.6 Land-use and transport planning vision 2030

The development of spatial planning in South Africa has been slow and its co-ordination has been inadequate. The complexity and overlapping of responsibilities between national, provincial and local sphere of government has contributed to poor spatial planning. Furthermore, the ambiguity in the Constitution regarding who is accountable for spatial planning has created problems for effective spatial planning. The planning approach has cemented provincial and municipal boundaries, which is making it difficult to plan for cross municipal

borders developments and collaboration between municipalities, as well as provinces. This has hindered development planning because many developmental issues such as economy, environment, as well as transportation overlaps political boundaries (National Planning Commission, 2012).

According to the National Planning Commission (2012), spatial planning in South Africa is dispersed across various national ministries, and is subject to parallel, and sometimes contradictory rules and regulations. Due to lack of national spatial development framework, state agencies and ministries occasionally overlaps its functions. In addition, provincial land-use management functions overlap with municipalities' functions, which is creating confusion and sometimes conflict. It is thus viewed that lack of capacity and technical skills has hindered development. This has further led to the reduction in the quality of the provincial growth, as well as co-ordination of plans and strategies, for development (National Planning Commission, 2012).

As a result of weak spatial governance, the spatial planning has tended to follow the private-sector investment pattern. The role of the private sector in spatial planning is crucial, but is contended that the overall spatial development pattern need to be shaped and influenced by the long-term public interest. There is a need for the state to engage the private sector on how best spatial planning and development could be improved in South Africa. The weakness in capacity mainly relates to execution and planning structures. For instance, lack of effective project management skills and project preparation, as well as lack of feasibility studies, results to poor understanding of the projects, misuse of funds and also service delivery backlogs. It is clear that effective spatial governance requires skills and professionals, as well as effective mobilised of communities (National Planning Commission, 2012).

Public transport in South Africa needs to currently strive to support democratic, efficient and integrated urban settlement patterns in contrast to the subsidised segregation of the previous regime. There is a need to acknowledgement that the subsidised commuter bus services are still supporting untransformed land-use and settlement patterns. Without this acknowledgement, there could be a propensity to believe that technical alterations to contracts is all that is desirable to transform things, yet fundamental structural spatial planning interventions are obligatory (National Planning Commission, 2012).

There is a need for commitment by Metropolitan municipalities to attain fully integrated road-based public transport systems. The key “benefit is that by providing increased investment in integrated road-based public transport systems, government will be purchasing decongestion of the Metropolitan areas together with support for continued and even higher rates of economic growth”. In addition to this hard economic objective, “integrated public transport network planning offers the means of securing the economic and social transformation of South Africa’s Metropolitan areas”. From sometimes unsafe, rather, unduly segregated areas, “sound integrated public transport can transform unattractive, unsafe and poorly planned settlements into attractive, safer, socially sustainable and accessible areas to work, invest and live” (National Planning Commission, 2012).

In order to successfully integrate transport and land-use, the following processes to the existing system need be executed: (a) review of the national planning system, which should provide platform for integration between environmental management, spatial planning and transport planning. This further requires the national planning approach need to foster a much tighter integration of spatial planning and long-term infrastructure investment, as well as finance regimes; (b) enhanced spatial planning and co-ordination. The reality is that spatial planning functions at national sphere are scattered across several departments, including Cooperative Governance and Traditional Affairs, Rural Development and Land Reform, Transport, Environment Affairs, Trade and Industry and Human Settlement (National Planning Commission, 2012).

4.7 Summary

It is clear from the discussions above that, in order to integrate transport and land-use planning successfully, various factors must be taken into account. Legislation that deals with transport and land-use planning need to be properly integrated and coordinated in order to avoid conflict and non-enforcement. There is a need for different spheres of government to work together so as to realise the goals and benefits of an integrated transport and land-use planning.

The South African legislation and policy frameworks are very clear in respect of the integration of transport and land-use planning. The frameworks emphasise the importance of the development of urban development, where public transport network is at the centre. Nevertheless, the integration of transport and land-use planning have not been effective in practice because of various factors, such as lack of coordination, funding, capacity, public engagement and political will.

Various stakeholders appreciate the significance of integrating transport and land-use planning. There are attempts and initiatives to integrate the two functions but with little success. The Acts and the Policy frameworks still encourage the separation of the two functions because their integration is not institutionalised and not enforceable. The next chapter reviews and discusses three international cities that have been successful in the integration of transport and land-use planning.

CHAPTER 5: INTERNATIONAL CASE STUDIES

5.1 Introduction

In this chapter, three case study cities that have implemented integrated transport and land-use planning are explored. The selected cases are Curitiba (Brazil), Portland (United States of America) and Copenhagen (Denmark). The idea of examining these case studies is to answer the research question on “*which international cities have been successful in integrating land-use and transport planning, and what lessons can be learned from them*”. The key thematic areas used to examine the case studies are (i) *City profile*; (ii) *Processes of the integration of land-use and urban planning*; (iii) *Integrated public transport planning and city-wide network programmes*; and (iv) *Institutional arrangements*.

The integration of public transport with land-use planning is viewed as a significant for the development and advancement of sustainable urban cities. To achieve sound integration, the following must be in place: a coherent, as well as clear strategic vision for future city development; sustainable financial models; and enabling institutional framework. It is also critical that institutional frameworks, regulatory frameworks and planning tools facilitates regional collaboration, as well as cross-sector co-operation (Suzuki et al., 2013). The cities used as case studies were reviewed and discussed in sections 5.2-5.4.

5.2 Curitiba - Brazil

5.2.1 City Profile

Parana is one of Brazil's southern states and is bordered by Parana River, Atlantic Ocean, Sao Paulo, Santa Catarina, Mato Grosso do Sul, Argentina and Paraguay. Parana is the ninth largest state in terms of its area cover, which is 199,314.9 km². Most significantly, Parana is home of the National Park of Iguacu, which is the UNESCO World Heritage Site. The capital city of Parana is Curitiba. The Parana

state has a population of over 10 million people (www.brazil.org.za). Curitiba is found in the southern part of Brazil (Figure 5.1) and is around 400km from the city of Sao Paulo, which is the largest economic hub in Brazil (Investor's Guidebook, 2010). During the crucial 1965 development plan, population was in the region of 500,000, and its growth was 5%. However, during 1990's, population increased to 1,600,000, but its growth rate was 2.3% (Smith and Raemaekers, 1998). The population of Curitiba, as of 01 July 2017, is estimated at 1,908,359. The total area of Curitiba is 435.27 km² and the density is 4,384.3 km² (www.citypopulation.de).

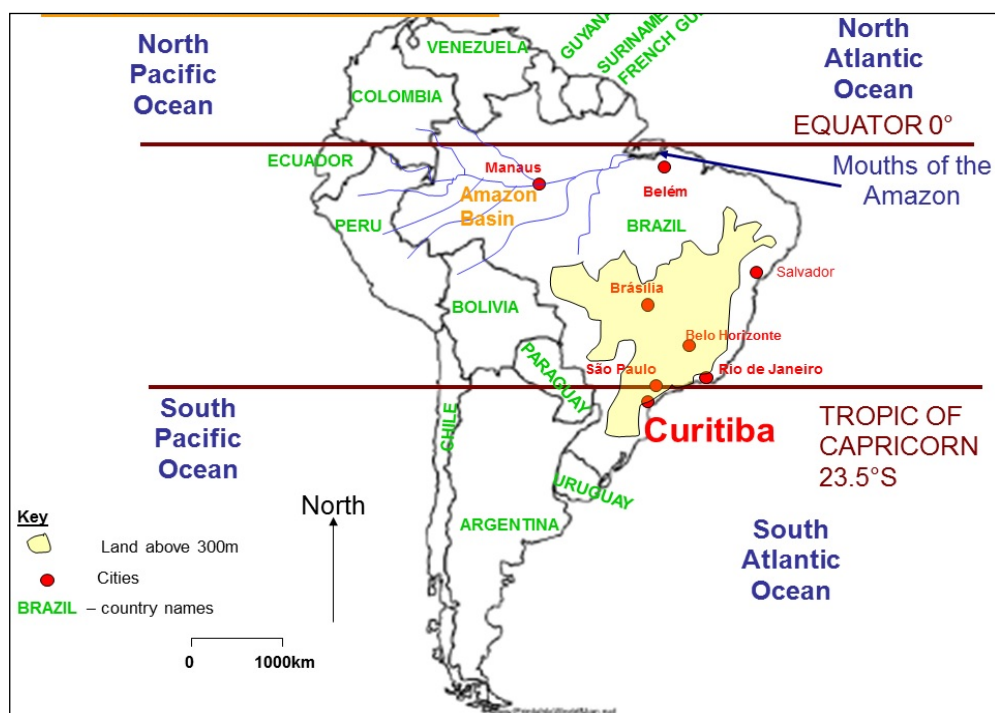


Figure 5.1: Locality map of Curitiba, Brazil. Source: www.coolgeography.co.uk

Curitiba ripened during a military dictatorship and matured within a highly centralised government system. This highly politicised environment served as the framework for the city to develop. Curitiba has been governed by the same political party for more than 40 years, which has contributed to political influence in their planning system. Given that planning in Curitiba was an intrinsically political process, previous planning efforts only addresses the city growth, but restricted the expansion of planning to zones within its political boundaries irrespective of consequences to the surrounding municipalities (Macedo, 2004).

Macedo (2004) indicated that “what was happening outside of the city limits had a much greater and more negative impact on it, offsetting the positive impact of many initiatives”. Land-use controls and existing legislation were not adequate to discourage environmental degradation even within Curitiba. The main institutional factors allowing degradation in the Metropolitan region were lack of leadership at the state level, absence of financial and operational means to enforce legislation, disconnection between land-use policy, legislation and population dynamics, and lack of co-ordination amongst the different levels of government, as well as local administrations (Macedo, 2004).

Curitiba is strategically located in the heart of Mercosul, which is the Southern Common Market, near the great consumer markets in Brazil. Curitiba has rail and road networks connected to the airports and ports. It is considered a reference point when it comes to urban planning, mainly as a result of its quality public transport system, environmental programmes, as well as successful social programmes (Investor’s Guidebook, 2010).

5.2.2 Land-use and urban planning

Until the early 1800s, Curitiba’s urban form was irregular, generally following topographical features, which was a characteristic of Portuguese settlement. Changes in this pattern started occurring in the mid-to-late 1800s, when passage of the Law of Lands, which mark the end of slavery, established private land property, and also ensured that agrarian policies contributes to economic expansion, investment and also attracts European immigrants to the region as agriculture labourers. Parana developed a strong agricultural tradition because of these immigrants (Macedo, 2004).

Wilhelm’s 1966 Master Plan, as indicated in the Figure 5.2, was the only comprehensive plan conceived for the city of Curitiba. Wilhelm’s plan changed the radial system established by the 1943 Agache Plan (Figure 5.2), by proposing public transport network-based axes, thus guiding the future growth of the city in a

linear pattern. The Wilhelm's plan recommended an integrated planning structure founded on three basic elements: roadway system, public transport network and land-use. The plan integrated land-use patterns and their conforming zoning regulations with the hierarchy of roadway system and public transport network (Macedo, 2004).

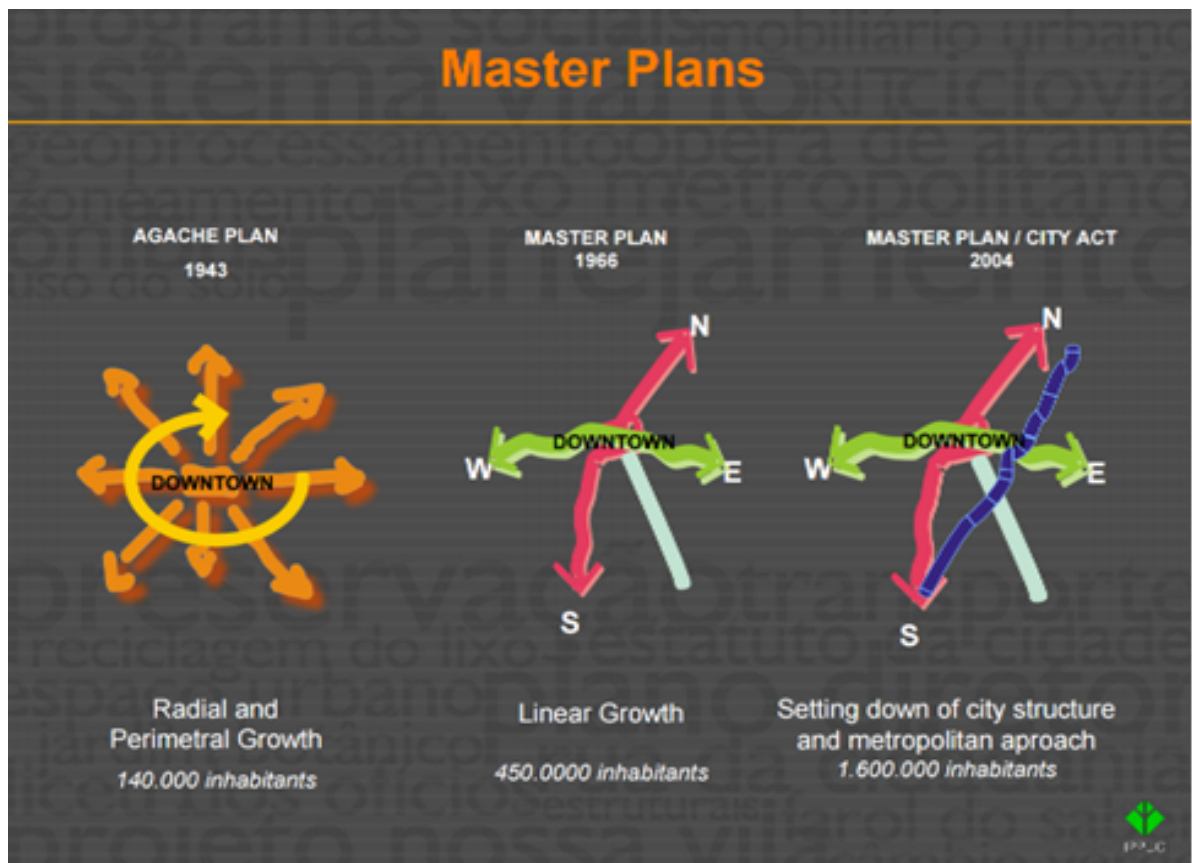


Figure 5.2: Master plans for the city of Curitiba. Source: Vallicelli (2008)

According to Rabinovitch (1996) the public administration of Curitiba commissioned the Preliminary Urban Plan in 1964, which later became the Curitiba Master Plan. The Curitiba Master Plan had the following key principles: (a) demographic control and management; (b) decongestion of the central area and preservation of the historic centre; (c) economic support to urban development; (d) changing the radial urban growth trend to a linear growth; and (e) infrastructure improvement (Rabinovitch, 1996).

Since 1965, the Curitiba Research and Urban Planning Institute (IPPUC) played a crucial role in the development and execution of the Curitiba Masterplan. However, the implementation of the plan was initiated during 1971 as a direct political decision of the first administration of Mayor Lerner. The Curitiba Master Plan addresses both land-use and transportation controls, which were regarded as complementary tools for guiding the city growth. The transport and land-use controls were integrated in order to direct growth out of the central city into arterial growth corridors. These growth corridors were demarcated by arterial and feeder roadways, as well as land-use controls, on settlement densities (Rabinovitch, 1999).

The five structural growth corridors aim was to re-direct growth out of the central city into corridors. The priority connections run between corridors and connect the structural roads. The movement of growth out of the central city led to redistribution of settlement densities in the city centre and the surrounding districts. This assisted in avoiding a sharp increase in central city densities, reduce noise, as well as traffic congestion (Rabinovitch, 1996).

As illustrated by Figure 5.3, another important element of Curitiba's planning system was the road hierarchy. Each road is apportioned a function in proportion to its importance and location. Four basic categories were used to define roads by function and location in Curitiba (Rabinovitch, 1996).

Land-use controls target two basic parameters, which are density of development and kind of use. The four basic land-use are commercial, residential, industrial, as well as mixed categories. However, acceptable densities differ in relation to the available transportation (Rabinovitch, 1996).

As illustrated by the Figure 5.3, the land-use density controls encourage a change of development activity from the central city to and around the structural axes. This approach locates high-density commercial and residential development in the same region, which thus matches density to the availability of public transport. This reduces human and traffic congestion in the central city. As a result of reduction of traffic, central city developments were converted into walkways and open-air pedestrian malls (Rabinovitch, 1996).

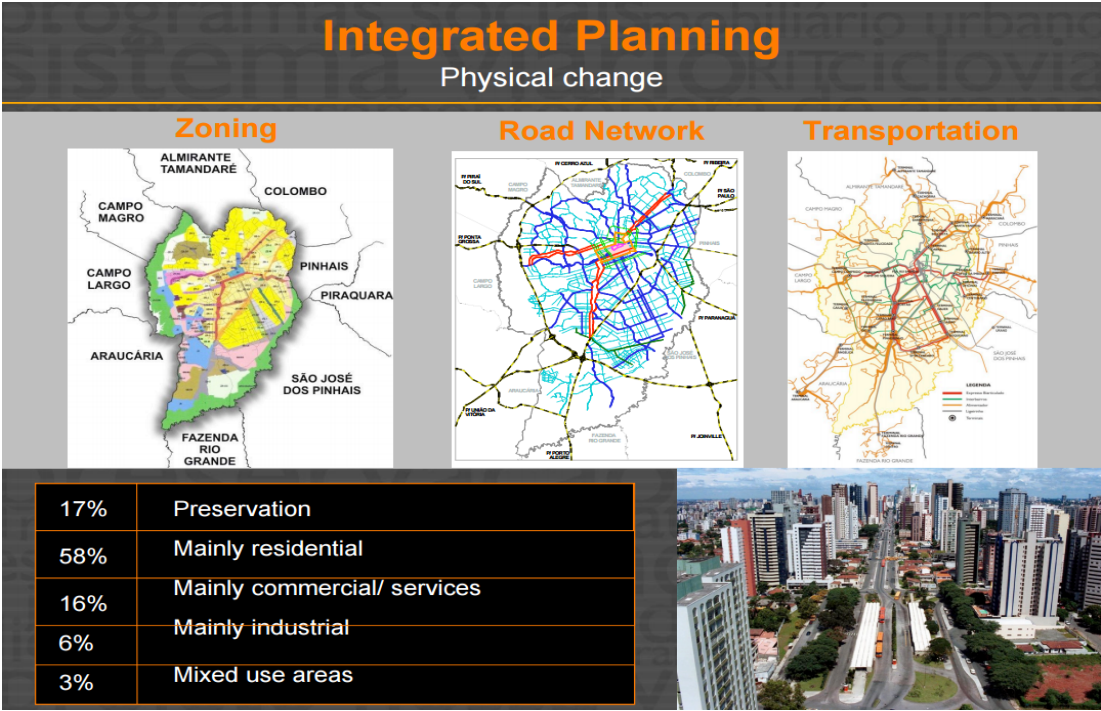


Figure 5.3: Integrated planning for Curitiba. Source: Vallicelli (2008)

5.2.3 Transport planning and public transport networks

Wilheim's 1996 Master Plan advocated for mixed use and higher densities along the core transportation corridors, which therefore forms the development axes of the city (Figure 5.4). Densities increased as distance from main roads and public transport networks routes increased. The integrated planning structure involved areas for exclusive or special use by pedestrians and an increase in open green space, as well as a renewed urban landscape and historic preservation initiatives (Macedo, 2004).

The integration of transport and land-use planning was regarded as an important tool for guiding and co-ordinating growth. The five arterial corridors were planned and steadily implemented to fan-out from the central area (see Figure 5.4). These corridors were established using existing streets but with minor physical alterations. The layout of the corridors followed demographic growth tendencies. The corridors act as high-density pathways for both circulation, transportation and settlement growth. However, dedicated busways were allocated as centre lanes for each corridor (Rabinovitch, 1996).

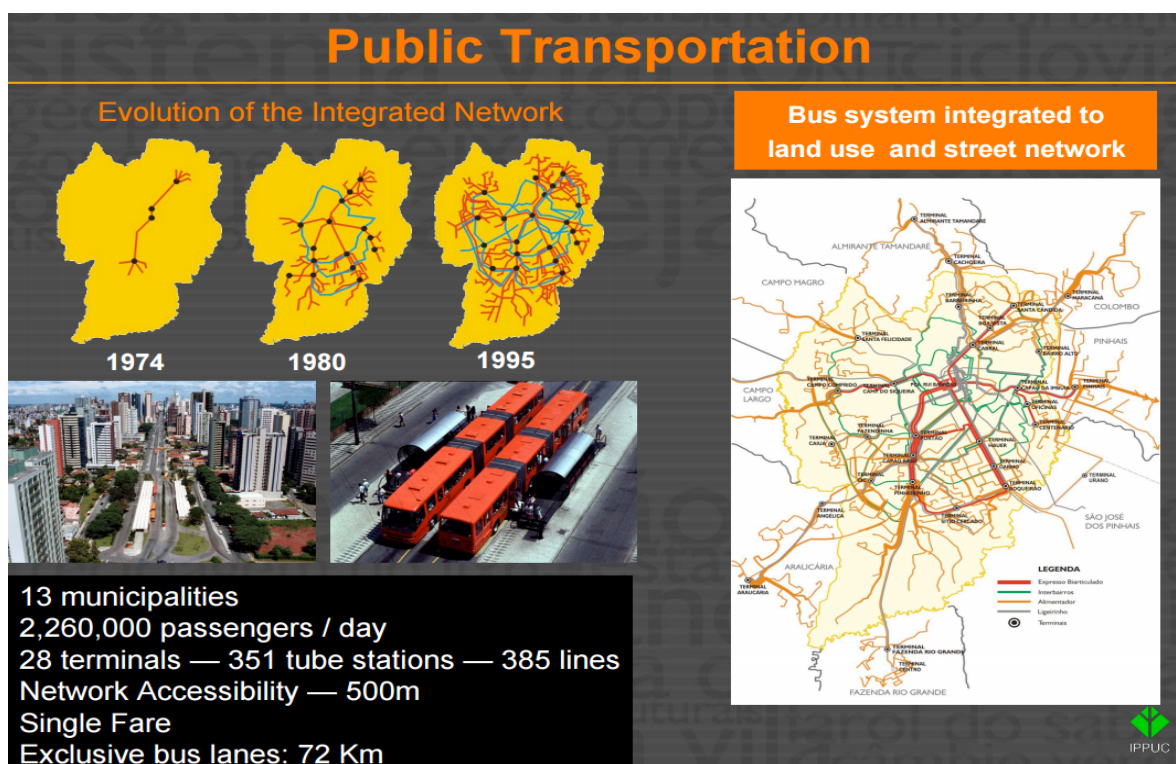


Figure 5.4: Evolution of integrated transport network in Curitiba. Source: Vallicelli (2008)

The integration of transport and land-use planning in Curitiba is often associated with the shape of the public transport network. The urban star is the shape of both settlement and network of express busways. The pattern has two further elements: (a) short feeder lines connecting mainly with the express and inter-district links at interchange station, and (b) concentric inter-district lines. The

Integrated Transport Network (ITN) is formed by the bus lanes and the recently introduced direct and bi-articulated lanes (Smith and Raemaekers, 1998).

In 1963, a state owned entity called Urbanizao de Curitiba (URBS) was established to manage the Curitiba Public Transport Network. The URBS co-ordinate and monitors the system, maintain the infrastructure of the system, while the private companies operate the bus lines. The buses are run and owned by 16 private companies, which receives licences for specific lines, and are paid per km not per passenger (Freiberg, 2000). The execution of Curitiba's public transport network system started in 1974, with the formation of north-south routes, which connects the downtown (Figure 5.4). Successive implementation and expansions of east-west routes turned the system into what is known as the Integrated Transportation Network, initially with 21 integration terminals (Macedo, 2004).

During the 1970s and early 1980s, there was successive openings of new express lines along busways and their conforming feeder lines resulted in a rapid shift from "the conventional bus network to the express lines running along the structural axes" (Figure 5.4). Generally, the new integrated transport network's share of ridership has risen from below 10% of the total in 1974 to 70% over the years. The "linear model as implemented in Curitiba has been successful in concentrating passenger flow along the new busway network, integrated with land-use planning" (Smith and Raemaekers, 1998).

5.2.4 Institutional arrangements

Brazilian civil framework is basically comprised by the judicial, executive and legislative at the local, provincial and national spheres. At the municipal sphere, the Municipal Council has the legislative power while the Mayor and City Hall have the executive powers. At the municipal level, there are no courts of justice or judges. Municipal by-laws can be developed by the City Hall, but such laws has to be approved by the Municipal Council. However, a declaration can be directly issued by the Mayor to pass the law without formal approval by the Municipal

Council. The Brazilian Constitution clearly determine whether a particular law can be enforced by a decree or a law. However, a decree normally stipulate in more detail the contents of a law (Rabinovitch, 1996).

During the development of the Master Plan in 1965, two new institutions were created: the Affordable Housing Company of Curitiba (Cohab-CT- Companhia de Habitacao Popular de Curitiba) and the Urban Research and Planning Institute of Curitiba (IPPUC - Instituto de Pesquisa e Planejamento Urbano de Curitiba). The IPPUC was chartered to steer the implementation of the Master Plan. The IPPUC was established as an independent agency, but also connected to the Mayor's office (Macedo, 2004).

Curitiba is one of the core municipality of a Metropolitan region that is comprised of 25 municipalities. The Metropolitan Region of Curitiba (RMC- Regiao Metropolitana de Curitiba) has a total population of 2.7 million, though the city of Curitiba only comprises 61% of the total urban population in the Metropolitan region, and together with 10 abutting municipalities comprises 93% of the total population of the RMC (Macedo, 2004).

In terms of the Figure 5.2, the Master Plan is the government plan, managed by two public entities (IPPUC and Cohab-CT) and consists various Sectoral and Local government plans. The community forms a crucial element of public participation as part of democratising buy-in of the Master Plan (Figure 5.2). Relevant information was collected and used during the planning of the Master Plan. The requisite capacity needed to implement the Master Plan was also taken into consideration during the planning processes.

5.3 Portland – Oregon, United States of America

5.3.1 City Profile

Portland is Oregon's largest city found near Willamette and Columbia rivers. It is situated in the shadow of snow-capped Mount Hood (Figure 5.5). As the largest city, the city of Portland has 376.6 km² of land, with a population of 585,845 people. The Metropolitan area of Portland (Portland-Vancouver-Hillsboro Metropolitan Area) covers a land area of 17,310 km², with population of 2,289,800 people. Most of people falls under the Metros, which were established in 1978. Metro is comprised by 25 municipalities having a land area cover of 1,209.52 km² and a population of around 1.5 million. Planning governance is a "shared responsibility with zoning power held by the municipal governments in the region, but many key funding powers, such as the funding for public transport network, is controlled by the Regional government" (Rae and Summers, 2016).



Figure 5.5: Map of Portland, Oregon. Source: www.alamy.com

According to the Portland Plan (2012), Portland is one of the largest employment centres in Oregon and the hub for various business services. The Portland is second amongst the USA Metropolitan areas. It has also the highest percentage of bike commuters and more than 300 miles of developed bikeways (Portland Plan, 2012).

5.3.2 Land-use and urban planning

The key elements in Portland's success, as illustrated in Figure 5.6, include: (a) the Central City Plan that focuses on development adjacent to the public transport network; (b) development that happen at a pedestrian scale with a mix of uses; (c) strict limits of commuter parking; (d) an investment in improved public transport network; (e) a balanced transportation strategy; and (f) an Urban Growth Boundary (UGB) that lawfully defines rural and urban areas (Arrington, 1996).

In 1978, a new agency called Portland Metro was established. It was mandated to manage the new Urban Growth Boundary (UGB) and regional co-ordination of land-use planning, as indicated in Figure 5.6 (Rae and Summers, 2016). The Metro administers UGB collaboratively with significant input from property owners, public, counties and cities. The state's Land-Use Board of Appeal serve as the final arbitrator (Kline et al., 2014).

The Urban Growth Boundary (UGB), illustrated in Figure 5.6, was reviewed over the years and the Metro Region 2040 Growth Concept was adopted (Figure 5.6). The building blocks of the Region 2040 Growth Concept are: (a) maintaining a tight Urban Growth Boundary; (b) focusing growth on public transport network; (c) preserving residential neighbourhoods as the dominant land-use; (d) developing a system of urban green spaces for nature and active use; (e) expanding MAX and the bus system (Arrington, 1996).

The Metro 2040 Growth Concept, as illustrated in the Figure 5.6, sets a regional agenda on how growth could be concentrated, particularly based on the goals for protecting farm land and natural areas, promoting a multimodal transportation system and making efficient use of land. The 2040 Growth Concept in Portland calls for concentrating commercial and residential developments in and around mixed-use areas, which include the Gateway Regional Center, Central City, six town centres, main streets corridors, as well as in light rail station communities (www.portlandonline.com).

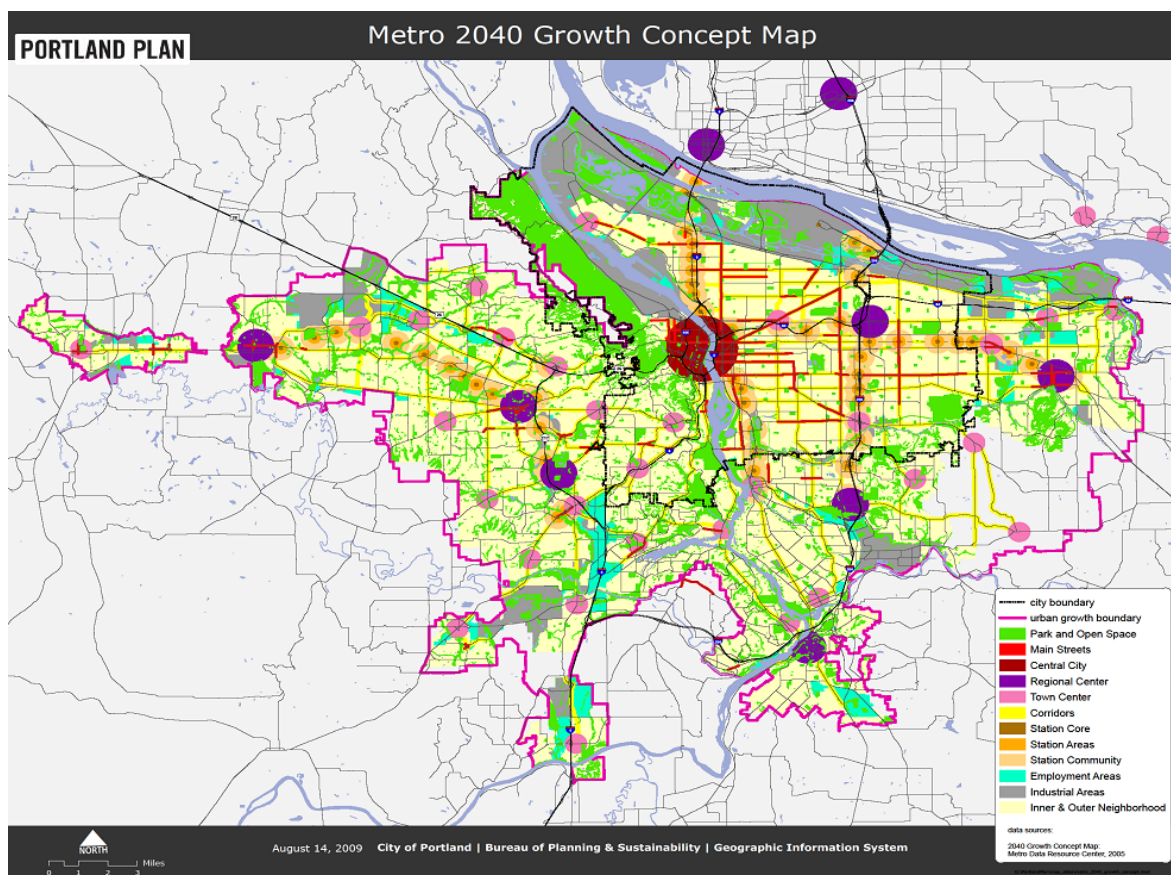


Figure 5.6: Portland Metro Growth Concept Map. Source: Bureau of Planning & Sustainability (2009).

5.3.3 Transport planning and public transport networks

In Portland, integration of public transport network and land-use enjoy excessive backing because they are the tools that are used to attain a liveable and sustainable communities. A successful public transport network and land-use strategy requires a good working partnership between local governments and the public transport districts. The local governments along the rail corridors are expected to ensure that developments are physically more reliant on public transport network through constraining automobile access, limiting parking, improving pedestrian access, widening sidewalks, higher density development, and allowing a mix of uses. Tri-Met is thus anticipated to offer the essential public transport network service to accommodate their growth (Arrington, 1996).

The Portland MAX (Metropolitan light rail system) has been part of a strategy to accede highway investments, rejuvenate the city centre, shape growth and clean the air. These manifold objectives have assisted as a guarantee to return public's investment and leverage the broad-base political support needed to secure the funding to build a rail line. An important part of MAX's value has been its capability and ability to serve as a catalyst for moving the region's growth development agenda forward. The achievement of that agenda has resulted in MAX expansion and land-use planning to the greater level (Arrington, 1996).

The Public Transport Network are extensive, consists of 222 miles of freeways, 226 miles of arterial streets, 12,78 miles of Streetcar Urban Circulator services having 76 stops, close to 1,400 miles of bus transit service having over 4,500 stops, and 39.5 miles of light rail (MAX) having 70 stops and 5 lines (Portland Bureau of Transportation, 2016).

The long-term plan of MAX in Portland consists of (a) Lloyd District-moving Downtown East; (b) Pioneer's Place-Portland's "100% corner"; and (c) Gresham Civic Neighbourhood. The long-term plan has the following key elements that served as the strongest development response to the MAX: (a) developable land

that was consolidated under single ownership; (b) include multiple private and public objectives; (c) availability of implementation tools; and (d) locations of stations in places with development potential (Arrington, 1996).

5.3.4 Institutional arrangements

Oregon passed Senate Bill 100 (SB 100) in 1978, which was considered as a landmark land-use planning bill. The Oregon Land Use Act (SB 100) required all cities and counties to prepare comprehensive land-use plans in accordance with 19 state-wide goals, conserve agricultural and forest lands, and provide for the efficient and orderly transition of rural lands to urban uses (Kline et al., 2014). The SB 100 further led to the establishment of the Department of Land Conservation and Development (DLCD) as the main implementation body. The DLCD also adopted the Transportation Goal in 1974 and Transport Planning Rule in 1991 (Bianco and Adler, 1998).

The mandate of the Transportation Planning Rule (TPR) was to guide jurisdictions in Oregon to meet the Transportation Goals. Those goals are “to provide a safe, convenient and economic transportation system,” while solving the needs of the “transportation disadvantaged.” The “TPR strives to achieve its mission by ensuring that jurisdictions within a Metropolitan Planning Organisation area adopt a Transportation System Plan (TSP)”. The TSP contain specific elements, which includes a bicycle and pedestrian plan, public transportation plan, and transportation financing programme, which must be reviewed every five years (Bianco and Adler, 1998).

Public participation processes of Portland includes an organisation called “Friends of Oregon”. This organisation is a “public interest group consisting of 1,000 members and since the 1970s has dedicated itself to the enforcement and protection of Portland land-use laws”. The most central members within the group are its attorneys, as well as the principles of the Rule. The 1,000 Friends have a powerful weapon: the threat of lawsuits against any entity, be it private or public,

which violates the sanctity of the land-use laws. They are also powerful due to their successful record of winning land-use law cases in the state. As a result, the “state relies on the support of 1,000 Friends in the implementation of its policy” (Bianco and Adler, 1998).

In order to fast-track the execution of the Region 2040 Growth Concept and further assist maintain a tight urban growth boundary, municipalities advocated for an early implementation strategy to bind them. The “Urban Growth Management Functional Plan” was universally approved in July 1996 by the Metro Policy Advisory Committee of local officials that represent 89% of the region’s population. The plan hold a zero possibility to the expansion of UGB (Arrington, 1996).

Local governments were required since 1992 to change their plans so as to obey with a state mandates - guiding growth around public transport networks. These new measures, among others, calls for adoption of local regulations to allow transit-oriented development, tight regional parking ratios for non-residential uses and 10% reduction in vehicle miles travelled (VMT), as well as parking per capita in 20 years (Arrington, 1996).

5.4 Copenhagen - Denmark

5.4.1 City Profile

Denmark is a country in the European continent. Its neighbouring states are Germany and Sweden (Figure 5.3). The capital city is Copenhagen. The area is 86.20 km² and the estimated population in December 2016 was 763,908. The majority of people 601,448 reside in the Municipality of Copenhagen. As of January 2016, larger urban area has a population of 1.3 million people, whereas the Copenhagen Metropolitan area has a population of more than 2 million residents (<http://www.dst.dk/da/Statistik>). Copenhagen is found on the far eastern-side of the Zealand Island, within the Oresund region (www.world-guides.com).

The Greater Copenhagen covers the north-eastern Zealand. The number of people at the Greater Copenhagen is 1.8 million, which account for a third of the Danish population. The “geology of the area differ from fertile plans separated by valleys in the southern and western part, to the undulating and hilly terrain of northern Copenhagen”. The Copenhagen urban landscapes is comprised of densely built parts in the city centre, and in the local centres alongside the major traffic route. The Copenhagen green space comprises of a mixture of agricultural land, grassland and forests, as well as recreational facilities, such as sports grounds. The north and north-west side is characterised by extensive forests, while the peri-urban areas are mostly open agricultural lands. Notwithstanding the open appeal of the land, the majority of rural population are urbanites residing in cottages or farm houses. Despite the availability of agricultural lands, the number of full time farmers in the peri-urban zone is very low (Vejre et al., 2007).



Figure 5.7: Map of Copenhagen, Denmark. Source: <https://kids.britannica.com>

5.4.2 Land-use and urban planning

Greater Copenhagen is divided into four geographical areas with dissimilar planning prospects. On the core urban region, also known as the palm of the hand, urban regeneration and development takes place within the existing urban zones and take into account the prospects to reinforce public transport services. In the peripheral urban region, also known as the finger city, new urban functions and urban development are positioned with consideration for the existing and future infrastructure, as well as for the reinforcement of public transport services. The green wedges across urban fingers and even between them might not be transformed into urban recreational facilities or urban zones (Danish Ministry of the Environment, 2007).

The Greater Copenhagen Area and city of Copenhagen have a long custom of strategic planning with admiration to both traffic and localisation planning. The 1947 “Finger Plan”, as illustrated in Figure 5.8, described the circumstances for the future growth of the city and its surrounding areas. A hand was used as an illustration of the Greater Copenhagen areas, with the palm covering the city whereas the fingers or radials, showed the populated zones outside the city. The radials were defined alongside the city train network (S-trains) and regional train network, which were either planned for future construction or under construction during 1947 (Figure 5.8). Each station defined the centre of a town as cluster, and green zones were planned between the radials, with main roads built across them in order to provide better networks to the city centre. The “1947 Finger Plan, therefore, guaranteed the greatest possible passenger transport between the inner-city jobs and housing areas. After more than 60 years, Copenhagen is a unique European capital without major traffic congestion” (Vuk, 2005).

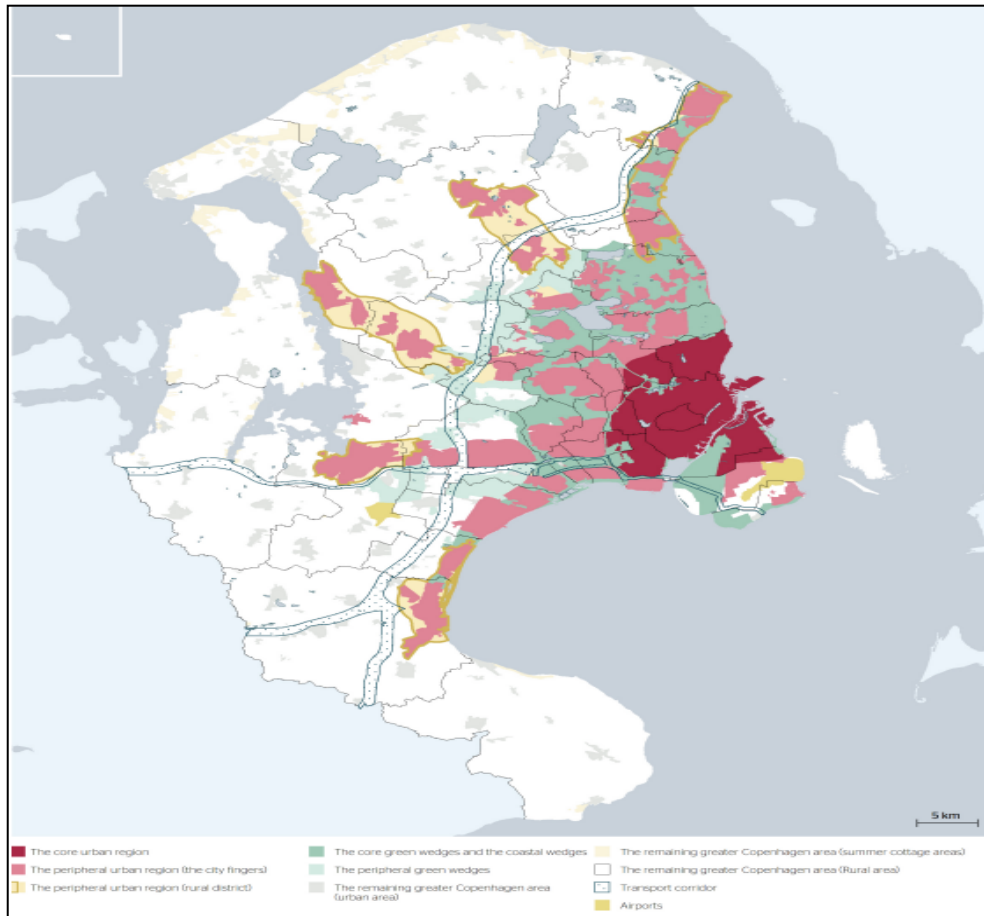


Figure 5.8: Copenhagen Finger Plan. Source: Danish Ministry of the Environment (2007).

The expansion was intended to decrease the congestion of the old urban core, locate an urban population close to open space and also to accommodate the city's growing population. As a result, the population of inner Copenhagen (the tiny Frederiksberg and Municipalities of Copenhagen) dropped by nearly 40% between 1950 and 1990. Subsequent modifications to the Finger Plan have included extending the fingers to towns in the hinterland - Frederikssund, Hillerød and Roskilde. The original 'thumb' spreads about 40 kilometres down the coast to the town of Koge and a new finger, now the longest, extends about 45 kilometres up the coast of Helsingør (Figure 5.8). In addition to "wedges of open space between the fingers, open space is preserved along the fingers, such that a finger can resemble a string of garden cities" (Bamford, 2009).

5.4.3 Transport planning and public transport network

In Copenhagen, the planning of the main public transport networks has been integrated into regional land-use planning. The State and municipalities have been able to agree on large projects, such as the Oresund Bridge, Copenhagen Metro and ring tramway. The “beneficiary pays” and “user pays” principles have been applied to the financing of the large projects and has been able to increase the value of land by successfully channelling the transport investment funding (Knowles, 1996).

According to Vuk (2005) the Copenhagen Metro is the key improvement made to Denmark’s urban public transport infrastructure. The main objective of the new public transport system in the capital was to upsurge market shares of public transport by enhancing urban development and reducing car traffic, as well as environmental impact caused by development. The construction of Metro started in 1994, and on the 19th of October 2002, the first phase was opened. In October 2003, phase 2 of the Metro opened, linking another part of the Frederiksberg city with the city centre”. Both Metro lines continuous their alignment in the phase from Norreport to Vanlose. The last anticipated phase of the Copenhagen Metro, phase 3, connect line M2 from Lergavsparken station to Copenhagen’s international airport at Kastrup. This phase open for operation in 2007. The full Metro system is a 22 km network, of which 11km is underground (Vuk, 2005).

With the expansion of the Metro networks, changes have been made to the “bus service in the capital, including the introduction of a so-called A-line bus network”. A-line buses are high-frequency city buses that operate without timetables. These buses cross the Metro network regularly and thus serve as an access mode to or from the Metro. These alterations were made in bus supply to reinforce public transport in the capital and lessen competition with the Metro by reducing traffic congestion and attracting a greater market share from car users to use the bus (Vuk, 2005 p.226).

5.4.4 Institutional arrangements

The Copenhagen Region or Copenhagen Metropolitan Area comprises of the Copenhagen County (inner suburbs), inner Copenhagen, and two adjoining counties of Frederiksborg and Roskilde, which encompass the fingertip regional towns, outer suburban fingers, and beyond. The Copenhagen Region operate as a single city, making up a continuous job and housing market. A new body called the Greater Copenhagen Authority was formed in 2000, and is responsible for the planning and other responsibilities for the region. In 2000, another finger was notionally added with the opening of the 16 kilometres connection across the waters of Oresund to southern Sweden (Bamford, 2009).

The main purpose of the Denmark Planning Act (Act No. 813 of 21 June 2007) is to safeguard that the overall planning amalgamates the interests of the society with respect to land-use, protect the country's nature and environment for sustainable development, conservation and security of wildlife and vegetation (Danish Ministry of the Environment, 2007).

In terms of the Denmark Planning Act, the Municipal planning "shall be carried-out based on the assessment of spatial development in Greater Copenhagen as a whole and shall ensure that the main principles of the overall finger city structure are continued". The urban development of regional important shall be co-ordinated with the extension of the overall infrastructure of Greater Copenhagen, with special attention for advancement of public transport services. The urban regeneration and development in the core urban region should takes place within the existing urban areas and with consideration for the opportunities for strengthening public transport services (Danish Ministry of the Environment, 2007).

In accordance with the Planning Act (2007), “delegates responsibility for spatial planning to the Minister for the Environment, 98 municipal councils and five regional councils”. The Planning Act is based on the “principles of the reformed planning legislation of the 1970s of decentralising decision-making authority and encouraging public participation in the planning process”. The municipalities are currently accountable for planning both country and town. The municipal plans thus have a new responsibility as the main driver for land-use and development and. The Planning Act mandates that the “municipalities take regional responsibility and determine their regional role”. Municipal planning in Greater Copenhagen is executed based on valuation of development in the region as a whole, and need to maintain the main principles of the overall finger city structure. Urban development of regional important must be co-ordinated with the expansion of Greater Copenhagen’s overall infrastructure, especially public transport services (Danish Ministry of the Environment, 2007).

In terms of the Denmark’s Planning System of 2007, the Minister for the Environment should establish an integrated framework for municipal planning and regional spatial development planning through overviews of national interests in municipal planning, national planning reports, national planning directives and dialogue. The role of the Minister is to act as a veto body in ensuring that municipal planning complies with national interests. The responsibilities given to the Regional Councils is to prepare and produce regional spatial development plans that describe a vision for the region. The new type of strategic plan also “captures the overall spatial development of the region and is closely linked with the business development strategy prepared by the regional economic growth forums” (Danish Ministry of the Environment, 2007).

The local plans are prepared frequently when needed. However, the municipal council has to approve a local plan before initiating major development projects. The Planning Act involves “the public in the planning process at the national, regional and municipal spheres. Before a municipal plan can be adopted, a national planning directive or a national planning report and regional spatial

development plan may be approved, a proposal and a report on the premises of the proposal must be published for public comments. The Planning Act “stipulates the minimum rules and legislation on public participation” (Danish Ministry of the Environment, 2007).

The municipal councils “summarise their strategy and objectives and for development in a municipal plan, which comprises a framework for the detailed local plans and for processing individual cases pursuant to the Planning Act and numerous acts governing other sectors”. Planning in the Greater Copenhagen is thus anticipated to uphold the key principles of the Finger City structure (Danish Ministry of the Environment, 2007).

5.5 Summary

There are key lessons learned from the three case studies of international cities that have been able to integrate transport and land-use planning successfully. The three case studies investigated show that there are key elements, which should be in place in order to integrate transport and land-use planning successfully. The first key element is the adoption of a long-term plan that integrates transport and land-use planning. The plan need to be legislated and enforceable. The second key element is to centre the integration of transport and land-use planning around a public transport network. It may be in the form of light rail, Metro rail or bus-rapid system. Measures should also be in place to discourage the use of private cars through initiating greater benefits and savings for using public transport. In addition, the public transport network should be able to increase accessibility and link socio-economic activities with residential areas. The third key element is an efficient and effective institutional arrangement. The relationship, coordination and integration of transport and land-use planning functions between the different spheres of government must be clear and functional. These three key elements are central to the successful integration of transport and land-use planning. In all the three case studies, the interrelationship of the three elements were clear and fundamental.

The three international case studies reviewed have successfully integrated transport and land-use planning functions. As such they can be applied in South Africa. However, other key elements such as resources, legislation and political will that are necessary for successful integration should be taken into account during the planning and implementation of the projects. It is, therefore, concluded that in order to integrate transport and land-use planning successfully, various factors as outlined above have to be taken into account. Acts and regulations that deal with transport and land-use planning need to be integrated in order to avoid conflict and overlapping of responsibilities. This requires that different levels of government to work jointly to attain the goals of an integrated transport and land-use planning. It is critical for institutional arrangements to be strengthened in order to effectively integrate transport and land-use planning. Different institutional arrangements need to be explored to support and accelerate the integration. The chapter that follows presented results and discussion.

CHAPTER 6: PRESENTATION OF RESULTS AND DISCUSSIONS

6.1 Introduction

In this chapter, the researcher presents and summarises the main results from the literature review, South African policy and regulation frameworks and the three international cases studies. The main trends and patterns from the data and information presented are with reference to the research questions. The main findings were interpreted, highlighting the main results, both positive and negative.

6.2 Key research questions to be answered and discussed

The key research questions are outlined below and were answered, as well as discussed in the sections that follow:

- *Why is it necessary, from a theoretical perspective, to integrate land-use and transport planning?*
- *What does the South African legislative and policy framework stipulate with respect to the integration of land-use and transport planning, and how effective has this been in practice?*
- *Which international cities have been successful in integrating land-use and transport planning, and what lessons can be learned from them?*

6.2.1 Why is it necessary, from a theoretical perspective, to integrate land-use and transport planning?

The integration of transport and land-use planning is necessary in order to reduce travelling distances, costs and time. Urban planning and design should bring origins and destinations together by focusing on accessibility rather than mobility (United Nations, 2013).

According to the UN Habitat (2013), people undertake a trip to perform or fulfil certain activities or tasks. In most cities, people are mandated to travel long distances in order to access their workplaces, clinics, schools, recreational centres, etc. (Taylor and Sloman, 2011). Their origins (where they stay) are not directly connected to their desired destinations (where the activities are taking place). As a result, travel times are long and costly.

Land-use planning is critical to transport. It is very significant to take into account the centrality of sustainable public transport system whenever new areas are developed. Where destinations (such as work, shops, as well as other services) are located relative to where people resides is an important factor in determining how much people need to travel (Taylor and Sloman, 2011).

Cities should consider accessibility to crucial socio-economic amenities before residential areas are determined. Town/urban planning should include transport plans before they are approved. Origins and destinations should be linked during planning stages and not regarded as an after-thought.

The focus on accessibility links the physical transportation infrastructure with the land-use system. They bring together land-use system with multiple transport modes. The existing transportation infrastructure can be defined in terms of the functions it serves, thereby connecting land-use and transportation, and bringing accessibility to the forefront of the plan (Berke et al., 2006).

Transportation investments shape urban form, just as urban form and land-use patterns that shape transportation. It is, therefore, the alterations in accessibility, not the physical structure itself, which drive land-use changes and urban-form, ensuing transportation infrastructure investment (UN Habitat, 2013).

Cities must strive to minimise the need to travel in order for people to spend time more productively at desired destinations. Cities can bring activities nearer together by inter-mixing land-uses, promoting low-travel and in-filling. The

integration and development of transportation and land-use and can significantly improve accessibility (Cervero, 2009).

The urban land-use/spatial structure and the transport systems have a recursive relationship. The land-use system leads to the changes in the travel patterns, which leads to the changes in the transport system. The transport system in return leads to the changes in the accessibility pattern, which again leads to the changes in the land-use system (Moore et al., 2007).

Many planners, at all levels of government understood, conceptually and intuitively, that a transportation/land-use connection existed and should be addressed at all levels. Many patterns lacked information, however, on exactly how that connection worked (directions and magnitudes of causes and effects), how it would be measured and what the likely impacts would be of policies aimed at influencing it (Moore et al., 2007).

There are many reasons why the interaction of transport and land-use planning have not progressed to the expected level. The main reason being that it involves encompasses non-institutional stakeholders and numerous institutions with conflicting mandates and values. The absolute difficulty of the matters and interdependency are also very high (Wadell, 2011).

Different authority levels and jurisdictions governing transportation and land-use planning intensify the difficulty in coordination of the two functions. In most institutions, transportation plans are regularly drawn at the regional level, while land-use plans are drawn at the municipal or country level. As a result, provincial transport plans and policies often conflict with local land-use plans and policies. These separate geographies create additional obvious conflict, further undermining the coordination between transportation and land-use plan (Berke et al., 2006).

In general, different levels of government are not legally required to coordinate their planning activities. Even when the planning activities are related and housed in different institutions, coordination is lacking among different departments and government public entities. Sometimes individual agencies operate like independent authorities and do not coordinate their activities with their 'sister' agencies or departments (Litman, 2009).

Transport and land-use planning have tended to be separate tasks. The problem is exacerbated further by the assumption that future land patterns are assumed given in terms of transport planning, "usually based on market projections, rather than on the land-use plan". Within this context, transport plans either strengthen past development tendencies or encourage development in areas and ways not anticipated in the land-use plan. Land-use planning, for its portion, habitually ignores the effects that huge transportation investments can have on land development. In other cases, the land plans accept much of the transport plans as outside inputs, "rather than as a plan element to be developed and co-ordinated jointly with land-use" (Berke et al., 2006).

The key elements that are necessary for the integration of transport and land-use planning are: (a) Coordinated institutional arrangements at all levels of government, both horizontally and vertically; (b) Availability of requisite and diverse skills; (c) Efficient and effective regulatory and policy frameworks (UN Habitat, 2013).

Transport and land-use planning processes need to be bounded-out of the confines of specific departmental and ministry mandates, and turned into an integrated and co-ordinated exercise at operational and policy levels. This will shift the focus on planning from placement of structures and destination of land-use to that of enabling the realisation of people's needs and everyday functions in the most efficient and sustainable manner (UN Habitat, 2013).

However, Taylor and Sloman (2011) contended that successful integration of transport planning with land-use planning could be realised simply through recognising that the process of development should be centred on public transport. The notion of “public transport centred development does factually mean that public transport should physically lie at the heart of development, but it must also include considerations about how the public transport interrelates with the development and about the quality of the public transport provision”. This seek to suggest that all new developments should centre on high quality public transport that delivers rapid links to the nearest major urban facilities and major centre of employment (Taylor and Sloman, 2011).

Factors that are crucial for successfully integrating public transport network and urban development includes: (a) inherent characteristics of cities; (b) institutional settings; (c) governance structures; (d) residential and job densities; (e) degree of land-use mixing; and (f) public sector initiatives, as well as actions (Suzuki et al., 2013).

Land-use planning at the provincial/metropolitan levels should lead the decisions regarding transport infrastructure investments. Such leadership may require a provincial land-use authority with the powers to create and enforce a provincial land-use and transport integrated plan. The plan would be guided by the national and provincial political process and then implemented by the local sphere of government (Cervero, 2006).

Certain regulations and administrative deficiencies at local and national government adversely affect the effective operation of land markets. The consequence is non-contiguous spatial development, under-or-oversupply of land, as well as alteration in land-use shapes that respond gradually to the principles created by public transport network infrastructure. These rules are major limiting factor to public transport network-oriented spatial development. The “deficiencies in administrative process and planning, therefore, make it problematic for the private sector to respond to the new development opportunities provided by the

increase in the economic value of land near public transport network and its corridors” (Suzuki et al., 2013).

Suzuki et al. (2013) pointed-out that land-use patterns influence travel demand, while public transport network shapes urban development. In this case, land-use variables reflect, not only trip interchange attributes, but also the attributes of the destinations and origins themselves. The deficiency of urban design elements delink public transport network system and surrounding neighbourhoods. The greatest obstacles for integrating transport and land-use is the huge upfront capital investment essential to improve public transport network system. This hindrance is particularly problematic to overcome, because unprecedented urban growth has put severe pressure on the ability of local government to finance urban services and infrastructure investments (Suzuki et al., 2013).

6.2.2 What does the South African legislative and policy framework stipulate with respect to the integration of land-use and transport planning, and how effective has this been in practice?

The South African legislation and policy frameworks are very clear in respect of the integration of transport and land-use planning. The frameworks emphasise the importance of the development of urban development, where public transport network is at the centre.

The Municipal Demarcation Act (No. 27 of 1998) stipulates that, when the Demarcation Board determine a municipal boundary, its objective should be to establish area that would: (a) allow integrated development; (b) promote the necessity for integrated, unfragmented and cohesive areas even in the Metropolitan areas; (c) take into account current and future economic, social, transport and land-use planning; and (d) stimulate the need for coordinated national, provincial and municipal services and programmes.

The Municipal Systems Act (No. 32 of 2000) prescribes the central components of integrated development plan, which should include a spatial development framework. Therefore the spatial development agenda need to include the delivery of basic procedures for land-use management system for the municipality. This framework binds both the local and district municipalities. The Municipal Systems Act outline the status of integrated “development plan as follows the principal strategic planning instrument, which informs and guides all planning and development, as well as all decisions with regard to management, development and planning within a municipality”.

The integration of transport and land-use planning have not been effective in practice, because of various factors. Various stakeholders appreciate the significance of integrating transport and land-use planning. There are attempts and initiatives to integrate the two functions but with little success. The Acts and the Policy frameworks still encourage the separation of the two functions, because their integration is not institutionalised and not enforceable.

The transformation of local government started with the promulgation of the Local Government Transition Act (No. 209 of 1993). The aim of the Act was to “provide for the revised interim measures with a view to promote the restructuring of local government, and for that purpose to provide for the establishment of Provincial Committees for Local Government in respect of various provinces”. The main objective of the Act was to define the powers and duties of the Local Government Coordinating Committee.

In terms of the Local Government Transition Act, the Metropolitan Councils are expected to: (a) coordinate and monitor local integrated development plans; (b) formulate and implement a Metropolitan integrated development plan, which incorporates Metropolitan transport planning, land-use planning, infrastructure planning, as well as promotion of integrated economic development; (c) coordination of passenger transport services after consultation with the

Metropolitan local council; (d) the provision and regulation of passenger transport services; and (e) traffic law enforcement.

The rearrangement of local government was further accelerated with the establishment of the Municipal Demarcation Board. The function of the Board is to “determine municipal boundaries in accordance with the Local Government Transition Act, and other applicable legislation enacted in terms of Chapter 7 of the Constitution”.

In terms of the Municipal Structures Act (No. of 1998), the “planning undertaken by a municipality must be aligned with, and complement, the development plans and strategies of other affected municipalities and other organs of state so as to give effect to the principles of co-operative government as contained in Section 41 of the Constitution”. The Act further “prescribes that municipalities must participate in provincial and national government programmes as required in Section 153 (b) of the Constitution”.

The Spatial Development Frameworks were followed by the proclamation of the Spatial Planning and Land Use Management Act (SPLUMA) (No. 16 of 2013). The SPLUMA provide a guideline for the (a) co-ordination, monitoring and review of land-use management system and spatial planning and; (b) norms, standards, principles and policy framework for land-use management and spatial development planning; (c) establishment, operations and functions of the Municipal Planning Tribunals; (d) facilitation and enforcement of land-use planning and developmental measures; (e) promote greater uniformity and consistency in the application procedures and decision-making by authorities responsible for land-use development and planning; and (f) address past spatial and regulatory imbalances, as well as other relevant matters”.

According to the National Planning Commission (2012), transportation connections are essential to the spatial transformation of urban areas. While there has been improvement in some cities in bringing new public transport infrastructure, the

major change from supporting private cars to incentivising public transport is yet to happen. It seems that inadequate attention has been given to integrating modes of transport and co-ordination across municipalities (National Planning Commission, 2012).

The White Paper on National Transport Policy (1996) acknowledged that transport and land-use development are not incorporated, due to a disintegration of roles for the regulations, planning and administration of the numerous features of regulations, operations, infrastructure and land-use. This disintegration and perhaps the legacy of apartheid systems have led to spatially dislocated settlements, urban sprawl and low density development as a , consequential for inordinately long commuting times and distances, high transport costs, low-cost recovery and low occupancy levels (White Paper on National Transport Policy, 1996).

The White Paper also indicated the following spatial development principles, which support passenger transport policy: (a) the effective functioning of industrial areas and cities need to be enhanced through integrated planning of transport and land-use infrastructure, transport operations and bulk services; and (b) Land-use development proposals must be subject to a transport or land-use policy framework within an agreed development planning process (White Paper on National Transport Policy, 1996).

The White Paper identified policy actions that are essential to provide for efficient land-use/transport and urban restructuring (densification) interaction, which need to be promoted by government. These actions included: (a) regulation of land-use development at local levels so that development approval is subject to conformity with integrated land-use/transport plans; (b) establishment of structures at all spheres of government to facilitate integrated planning of infrastructure, operations and land-use in a coordinated and integrated way; and (c) establishment of land-use policies, framework and guidelines to channel development, mainly

employment opportunities, into public transport nodes and corridors (White Paper on National Transport Policy, 1996).

The White Paper on Transport was followed by the launch of 'Moving South Africa,' a 20-year “strategic framework to bring on the vision set for the transport system in South Africa”. The “Moving South Africa (MSA) is focused on the fruitful implementation of integrated urban land-use plans with transport plans to safeguard that public transport corridors strengthen high density mixed land-use corridors and become a significant instrument to reintegrate urban areas”.

The processes of the “Moving South Africa” and “White Paper on Transport” culminated in the promulgation of the National Land Transport Transition Act (No. 22 of 2000) to provide for the transformation and restructuring of the national land transport system of South Africa. The main aim of the Act was the “coordination and promotion of institutional functions in land transport, and also that land transport functions must be integrated with related functions such as economic development, land-use and planning, development of corridors, densification and infilling” (National Land Transport Transition Act, 2000).

The National Land Transport Transition Act (2000) made “provision for the establishment of Transport Authorities to advance transport service delivery at municipalities through assembling transport functions into a single, well-managed and focussed institutional structure”. In terms of the Act, the Transport Authority is a juristic person that is distinct from the functions of the municipality. Transport Authority is “controlled and governed by the governing body appointed for it in terms with its founding agreement, which should be consisted exclusively of councillors of the constituent municipality or municipalities, the number of which is determined in the founding agreement”.

The National Land Transport Act (NLTA), No. 5 of 2009 was “promulgated to deliver further the process of transformational and restructuring the national land transport system initiated by the National Land Transport Transitional Act (No. 22

of 2000)". The purpose of the Act is to "prescribe national frameworks, guidelines, norms and standards, requirements and principles that must be applied consistently in the provinces and also to amalgamate land transport functions and locate them in the appropriate level of government".

The National Land Transport Act (2009) outlines the functions of different levels of government and how they must relate and integrate with each other. The requirements of this Act apply all over the Republic of South Africa. The Act also recognises the Minister as the Executing Authority at National Level and Member of the Executive Authority (MEC) as the Executive Authority at the Provincial Level.

In January 2007, the South African government approved the Public Transport Strategy (PTS), followed by the Public Transport Strategy Action Plan (PTSAP) in March 2007. The PTS has two main thrusts: (a) integrated Rapid Public Transport Networks pertains to the upcoming PTSAP's emphasis on executing high quality phase 1 networks of rail priority corridors and bus rapid transit corridors in 6 Metro cities; and (b) accelerated modal upgrading and Integrated Rapid Public Transport Networks (IPTNs). The modal upgrading refers to the current initiatives to transform bus, taxi and rail service delivery in the short to medium term.

PTS's longer-term dream till 2020 is to "develop a system that places more than 85 percent of a Metropolitan city's population within 1km of an Integrated Rapid Public Transport Network trunk (rail and road and) or feeder (road) corridor". Another goal is to achieve a mode shift of 20 percent of car work trips to public transport networks by 2020. The PTS recognise that a prioritised Network will serve as a basis for anchoring land-use development in order to maximise Network utilisation and to minimise travel distance and time. The Network will enable municipalities to be far more proactive with regard to channelling and regulating land-use in a manner that integrates with the Network.

In terms of improving institutional arrangements, the PTS advocates for the engagement with the Municipalities, Provinces, Department of Provincial and Local Government, Department of Land Affairs, and Department of Housing so as to advance inter-departmental co-ordination with respect to transport, land-use and housing integration. There is also a need to “fast-track the identification of priority local transport corridors and the related location of medium density land-use in support of these”. Therefore, land-use planning need to be aligned with travel demand, public transport network and non-motorised transport planning.

The PTSAP recognised the following key institutional driven factors that must be in place in order to implement the Integrated Rapid Public Transport Networks successfully: (a) integration of land-use planning with transport; (b) clarity of accountability; (c) effective integration of public transport modes; (d) effective enforcement, safety and security; (e) the right business model based on competition for the public transport market but not in the public transport market, (f) sufficient, reliable, predictable financial streams (g) pro-active maintenance; and (h) retention and attracting capable and skilled personnel.

The National Development Plan (NDP) 2030 report advocates for governmental policy that decentralise transport management to local government in order to align the conflicting and fragmented interests of multiple transport authorities, each with separate mandates and funding sources. The NDP report caution that attention should be taken when handing responsibility for transport over to municipalities. The delegation of the transport function may only succeed if it is complemented by reinforcement of institutions and alignment of practice, policies and legislation (National Planning Commission, 2012).

The National Planning Commission (2012) indicates that “transport planning should be led by central government to articulate reliable long-term plans for transport that harmonises with spatial planning”. It was further raised that the transport plans should align with the “infrastructure investment activities of local and provincial government, and must clearly communicates the state’s transport

vision to the private sector”. As “guided by plans for the urban form, the focus should be on achieving the mutually reinforcing effect of public transport network-led growth”. This could assist in increasing concentration in urban settlement, while at the same time improves the economies of scale for transport modes (National Planning Commission, 2012).

Unfortunately, the South Africa’s inter-governmental system of spatial planning has been sluggish to develop, and co-ordination has been poor. The complex division of functions and powers between national, provincial and local government has contributed to the problem. Furthermore, the ambiguity in the Constitution on who is responsible for spatial planning have created uncertainty. Nevertheless, the planning system has cemented provincial and municipal boundaries, making it almost difficult to execute cross borders plans and even for collaboration amongst municipalities, as well as provinces. This has hindered development planning as many developmental agendas concerns, such as economic, environmental and transportation issues, overlaps the political boundaries (National Planning Commission, 2012).

Spatial planning is disseminated across various national departments, and is matter to parallel and occasionally contradictory legislation. The legislation that controls land-use management is largely unformed and dates back to apartheid era. Without a clear framework for national spatial development, departments and state-owned agencies functions occasionally overlaps. For instance, the municipal land-use management functions overlap with provincial, which create conflict and confusion. It seems that lack of technical capacity has hindered development, which has also reduced the quality of the provincial growth, and effective co-ordination of strategies for development (National Planning Commission, 2012).

The National Planning Commission (2012) report argued that “one of the consequences of weak spatial governance is that spatial planning has tendered to follow patterns set-up by private-sector investment”. The role played by private sector in attracting investment is appreciated, but the overall pattern of spatial

development need to be shaped by long-term public interest. This requires that capability of the state to engage with the private sector to be improved. The “weakness in capacity relate to implementation structures and planning”. Lack of project management skills and effective project preparation and feasibility research, results in poorly conceptualised projects, failure to spend allocated budgets and causes service delivery backlogs, and. Effective spatial governance thus requires strong mobilised communities and professionals to execute the plans (National Planning Commission, 2012).

The integration of transport and land-use planning have not been effective in practice, because of various factors. There are attempts and initiatives to integrate the two functions, but with little success. The Acts and the Policy frameworks still encourage the separation of the two functions, because their integration is not institutionalised and not enforceable.

6.2.3 Which international cities has been successful in integrating land-use and transport planning, and what lessons can be learned from them?

With regard to land-use and urban development, the Curitiba Master Plan has been developed in 1965 and implemented since 1971 by the Curitiba Research and Urban Planning Institute (IPPUC). The implementation was as a result of direct political decision by Mayor Lerner, which shows political will to execute the plan. The Master Plan advocated for transport modifications, reducing high-density growth within the city centre, control of land-use, and decentralisation of development (Rabinovitch, 1996).

In Curitiba, the coordination of land-use and transport planning encouraged spatial settlement patterns that facilitated access to basic services, such as workplace, health care, leisure, schools, goods and services, and places of worship, thus decreasing the necessity to travel. Transportation planning, road network and land-use planning were key master plan tools used to guide and coordinate the growth pattern. The extension of the existing city centre as a compact form was

limited, but linear centre were developed as an alternative along transport corridors extending toward the outskirts of the city. The approach led to the development of growth corridors or radial centres - instead of growth nodes or compact centres (Cinquina, 2008).

In Oregon, the Senate Bill 100 (SB 100) was passed in 1973 and it is known as the landmark land-use planning bill. The Oregon Land Use Act (SB 100) required all cities and counties to prepare comprehensive land-use plans. SB 100 also created the Department of Land Conservation and Development (DLCD) as the principal implementing body. The DLCD also adopted the Transportation Goal in 1974 and Transport Planning Rule in 1991 (Bianco and Adler, 1998).

In 1947, Copenhagen adopted its first Finger Plan. The first Finger Plan's aim was to concentrate urban development in the fingers created by the radial road networks and suburban railway. It further aim to keep the green wedges between the fingers un-developed. The Copenhagen profile as a green capital was further reinforced in the future through a national planning directive on "Finger Plan 2007". The Finger Plan 2007 guaranteed that there is a clear delineation between rural and urban zones, but provide the best conditions for public transport and help municipalities to produce urban planning for the future (Danish Ministry of Environment, 2007).

According to the Planning Act (2007), the urban development "shall be coordinated with the expansion of the overall infrastructure of Greater Copenhagen, with special consideration for public transport services". This implies that "municipal planning shall ensure that urban regeneration and urban development in the core urban region take place within the existing urban zones, and with consideration for the opportunities to strengthen public transport services" (Planning Act, 2007).

The Copenhagen's Planning Act (2007) delegates responsibility for spatial planning to the municipal councils, regional councils and Minister for the Environmental Affairs. The Planning Act is founded on the principles of the renewed planning legislation of the 1970s of promoting public participation and decentralising decision-making authority in the planning process. Consequently, the municipalities are now responsible for planning of both country and town. They are also responsible for producing municipal plans, which are key plans for land-use and development (Planning Act, 2007).

In terms of transport planning and public transport networks, Curitiba's integration of transport and land-use planning was regarded as a significant tool for co-ordinating and channelling growth. In order to realise growth, five arterial corridors were planned, and progressively executed to fan-out from the central area. The corridors were developed on prevailing streets with only minor physical alterations. The design of those corridors resemble demographic growth propensities, and thus operated as high-density pathways for both settlement growth, transportation, and circulation. There was dedicated bus-ways, which were assigned as centre lanes for each corridor (Rabinovitch, 1996).

As indicated by Macedo (2004), the execution of Curitiba's public transport network system happened in 1974 through the creation of the north-south routes that connects the downtown. Further extensions and the execution of the east-west routes led the system into an Integrated Transportation Network (RIT-Rede Integrada de Transportes) with 21 integration terminals. The most far-reaching innovation to the RIT was an experimental route, which started in 1991 called the "Direct Line." This route was conceived to mimic an underground public transport network system, but on the surface, reducing trip time by using fewer, especially designed stops. Riders board buses from tubular structures known as "tube stations" (Macedo, 2004).

A state owned entity called Urbanizao de Curitiba (URBS) was established in Curitiba to monitor both the number of passengers and mileage covered by buses. It further adapts the frequency of buses and number of bus lines in accordance with demand. The scheme is totally financed by the bus charges without any public subsidies. The bus tariff is based on calculations done by the URBS, and it cover the profit proportion for the bus companies, maintenance, depreciation of the bus fleet, and personnel costs (Freiberg, 2000).

The Portland City has widespread public transport network system. The city comprises of 226 miles of arterial streets and 222 miles of freeways. Furthermore, Portland also has 12, 78 miles of Streetcar Urban Circulator services with 76 stops, about 1, 400 miles of bus transit service with more than 4,500 stops, and 39.5 miles of light rail (MAX) with 5 lines and 70 stops. The North-South Line links the core of downtown on the west-side of the Willamette River, and has been essential to job growth and dense-urban residential development (Portland Bureau of Transportation, 2016).

The main features in Portland's successes included: (a) the Central City Plan that focuses on development adjacent to the public transport network; (b) development that happen at a pedestrian scale with a mix of uses; (c) strict limits of commuter parking; (d) an investment in improved public transport network; (e) a balanced transportation strategy; (e) an Urban Growth Boundary (UGB) that lawfully describes the rural and urban areas (Arrington, 1996). In Portland, light rail is the infrastructure investment that is used to handle increased transportation pressure of growth in major corridors. Rail serves as a catalyst tool for governments to execute their land-use and transport plans by influencing the location and shape of development. MAX influence the location, design and timing of development (Arrington, 1996).

In Copenhagen, the planning of the main transport networks has been integrated into regional land-use planning. The State and municipalities have been able to agree on large projects, such as the Oresund Bridge, Copenhagen Metro and ring

tramway. Also, the “beneficiary pays” and “user pays” principles have been applied to the financing of the large projects. Copenhagen has been able to increase the value of land by successfully channelling the transport investment funding (Knowles, 1996). The key development made to Denmark’s urban public transport infrastructure was the establishment of the Copenhagen Metro. The main objective of the “new public transport system in the capital was to increase market share of public transport by reducing environmental impact, enhancing urban development and reducing car traffic”. Plans to construct the Copenhagen S-train connection between the islands of Amager and Sjaelland started in 1961. This arrangement was a straight line between the city and west Amager (Vuk, 2005).

In terms of the institutional arrangements, Curitiba is the core municipality of a Metropolitan region that comprises 25 municipalities. The Metropolitan Region of Curitiba (RMC - Regiao Metropolitana de Curitiba) has a total population of 2.7 million people, though the city of Curitiba contains 61% of the total urban population in the Metropolitan region, and together with 10 abutting municipalities comprises 93% of the total population of the RMC (Macedo, 2004).

During the development of the Master Plan in 1965, two new institutions were created: the Affordable Housing Company of Curitiba (Cohab-CT - Companhia de Habitacao Popular de Curitiba) and the Urban Research and Planning Institute of Curitiba (IPPUC - Instituto de Pesquisa e Planejamento Urbano de Curitiba). The IPPUC was chartered to steer the implementation of the Master Plan. The IPPC was established as an independent entity, but also connected to the Mayor’s office (Macedo, 2004).

The key elements in Portland’s success in the integration of transport and land-use and planning include a partnership between strategists and governments departments (Arrington, 1996). The city area is served by the only elected Metropolitan government in the United States. The Metro has power to administer urban growth boundaries, maintain compact and efficient urban form, and also to structure regional spatial planning (Gibson and Abbot, 2002).

6.3 Summary

It is clear that the integration of transport and land-use planning is essential in order to decrease travelling distances, costs and time. As also indicated in the United Nations (2013) report, urban planning and design should bring origins and destinations together by focusing on accessibility rather than mobility.

Land-use planning is critical to transport, which thus provide a need to consider the centrality of sustainable public transport system whenever new places are developed. This study concurs with Taylor and Sloman (2011) that where “places (e.g. work, shops, and other services) are located in relative to where people live is a major factor in determining how much peoples travel or need”. Therefore, land-use patterns influence travel demand, while public transport network shapes urban development. This means that land-use variables represent, not only trip interchange characteristics, but also the features of the origins and destinations. Therefore lack of urban design elements creates a disconnect between the surrounding neighbourhoods and public transport network system (Suzuki et al., 2013).

Land-use planning at the provincial/metropolitan levels should lead the decisions regarding transport infrastructure investments. Such leadership may require a provincial land-use authority with the powers to create and enforce a provincial land-use and transport integrated plan. The plan would be guided by the national and provincial political process and then implemented by the local sphere of government (Cervero, 2006). In terms of the South African legislative and policy framework, the Public Transport Strategy, 2007 (PTS) advocates for the engagement between departments and municipalities in order to advance inter-departmental co-ordination with regard to the integration of transport, land-use and housing. This study concurs with the Public Transport Strategy (2007) call on the “need to fast-track the identification of priority local transport corridors and the related location of medium density land-use”. It further requires land-use planning,

which is aligned to travel demand, non-motorised transport and public transport network.

The study further concurs with the Public Transport Strategy Action Plan (2007) that the following vital institutional driven factors that must be in place in order to implement the Integrated Rapid Public Transport Networks successfully: (a) clarity of accountability; (b) integration of transport with land-use planning; (c) sound integration of public transport modes; (d) having right business model which is based on competition for the public transport, (e) security, safety and effective enforcement of legislation; (f) regular and pro-active maintenance of the system; (g) reliable, sufficient, predictable financial sources; and (h) retention and attracting capable and skilled personnel.

The study further agrees with the National Development Plan advocacy for governmental policy that decentralise transport management system to municipalities in order to align the conflicting and fragmented interests of numerous transport authorities, having distinct mandates and funding sources. The National Development Plan report caution that care should be taken when handing responsibility for transport over to local government authorities. The delegation of the transport function could be successful if it is accompanied by strengthening of institutions and alignment of practice, policy and legislation.

Based on the three case studies examined, it is concluded that there are key elements, which should be in place in order to integrate transport and land-use planning successfully. The first key element is the adoption of a long-term plan that integrate transport and land-use planning. The plan should be legislated and be enforceable. The second key element is to centre the integration of transport and land-use planning around a public transport network. It can be in the form of light rail, Metro rail or bus-rapid system.

Measures should also be in place to discourage the use of private cars. The public transport network should be able to increase accessibility and link socio-economic activities with residential areas. The third key element is the efficient and effective institutional arrangement.

The relationship, coordination and integration of transport and land-use planning functions between the different spheres of government must be clear and functional. These three key elements are central to the successful integration of transport and land-use planning. In all the three case studies, the interrelationship of the three elements were clear and fundamental. The next chapter is the conclusions and recommendations of the research report.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

This chapter synthesises the main findings of the research project. The main results from the previous chapters are drawn together, summarised and concluded. Larger significance and value of the results is identified. Recommendations regarding the study, further research, as well as possible policy implications, are highlighted.

7.1 Conclusion

The integrated transport and land-use and planning is currently necessary in developing countries like South Africa. The integration of land-use and transport planning functions is essential to connect origins and destinations, and in the process, improve accessibility. However, successful integration of transport and land-use planning requires effective coordination of government departments at all levels, as well as institutions governing transport and land-use planning.

The three international case studies examined showed that there are key elements, which should be in place in order to successfully integrate transport and land-use planning. Most importantly, political leadership is key to drive the integration, as well as funds and skills, needed to implement the projects. In addition, transport planning need to be considered as a sub-set of community development and land-use planning. As a result, transport and land-use planning legislation should be integrated and effectively implemented. This study concluded that coordinated institutional arrangements, availability of requisite and diverse skills, efficient and effective legislation, as well as political will, are key elements that are necessary for the successful integration of transport and land-use planning.

Without coordinated institutional arrangements different spheres of government will continue to function in silos and the goals of improving accessibility will not be realised. Land-use will continue to be planned without taking into consideration

transport plans. There is bound to be duplication and wastage of resources. In addition, political will and commitment is central for transport and land-use planning functions to be integrated and coordinated successfully. Long-term vision and plans need buy-in from political leadership. Budget must also be lobbied between different stakeholders in order to implement the plans successfully.

A city-wide public transport network is necessary and can also serve as a mechanism to integrate transport and land-use planning. Out of the three international cities investigated, this study concluded that Brazil model has the most lessons for South Africa with regard to integrating transport and land-use planning successfully. This is because of socio-economic, political and environmental similarities between South Africa and Brazil. In addition, the technical skills and funding model between the two countries are similar, which would provide the possibilities for successful implementation of transport and land-use planning if the Brazil model was adopted and adapted. The relationship between South Africa and Brazil, through the BRICS agreement, further provides an opportunity for South African cities to adopt Brazil transport and land-use planning practices, because the agreement between the two countries promotes sharing of information, lessons and experiences.

7.2 Recommendations

The integration of transport and land-use planning is not sufficiently prioritised by the South African government at all levels. The functions are still often performed in isolation of each other, with little effort to coordinate and integrate them. While there are many laws, policies and strategies that are attempting to integrate transport and land-use planning, the bureaucracy in the different levels of government is making it difficult to implement. As a result, these laws are also not enforced. In other cases, the policies and strategies are no longer relevant and impede the attempts to integrate transport and land-use planning. While SPLUMA has been passed as a law that will assist in the integration of transport and land-use planning, some traditional authorities are of the view that the Act is infringing

on their authority. They believe that SPLUMA should be reviewed and the status quo before the Act be maintained. Considering the findings from this study, it is, therefore, recommended that:

- Transport and land-use planning functions should be located under one department or entity for better coordination and integration. The establishment of a new entity will be the best one to house both these two functions, with its own board and management. The entity can report directly to the National Development Planning Commission located in the Presidency, at the provincial level to the Premier and at the Local level to the Executive Mayor/Mayor. The entity will also ensure that the integrated land-use and transport plans are incorporated in the Medium Term Strategic Network (MSTF), National Strategic Land Transport Framework (NSLTF), Provincial Growth and Development Strategy (PGDS), Provincial Land Transport Framework (PLTF), Integrated Development Plans (IDPs) and Integrated Transport Planning (ITPs).
- The Spatial Planning and Land Use Management Act (SPLUMA), National Land Transport Act (NLTA) and Public Transport Strategy (PTS) and Public Transport Strategy Action Plan (PTSAP) should be taken into consideration when integrating transport and land-use planning. They must be treated in an integrated manner and be well coordinated.
- Technical skills and political will, as well as leadership to integrate transport and land-use planning, is also necessary for successful execution of the projects.
- Key elements that are necessary for the successful integration of the transport and land-use planning should be taken into account. In all the three international case studies reviewed, IPTN is at the core. The IPTN can be in the form of bus, BRT or rail, depending on the budget and skills available.
- In the case of South Africa, both rail (such as Gautrain) and Bus Rapid Transit (BRT) are already being utilised in major cities. They need to be strengthened and properly coordinated to link origins and destinations.

7.3 Reflections on the research

The researcher gained valuable experience during the literature review, examining the perspectives of the South African regulation and policy framework. Valuable lessons were learned from the international case studies of the three cities that were able to successfully integrate transport and land-use planning.

It was, however, found that literature on the integration of transport and land-use planning is scarce and not easy to access. The same applies to the literature on Public Transport Networks. This is mainly because transport and land-use planning are treated as separate functions and in isolation of each other in most government institutions. Many authors have written on urban-planning, transport, land-use planning and different modes of transport. Only few authors have gone deeper in terms of the integration of transport and land-use planning.

Another highlight is that most planners are skilled in either land-use or transport planning and rarely on both. As a result, there is inherently an academic and professional competition between land-use and transport planners. They have worked in isolation of each other for a very long time and it is not until recently that they have realised they need each other to successfully integrate transport and land-use planning.

7.4 Areas for further research

Various areas for further research have been highlighted in the research. More attention should be given to how institutional arrangements might be coordinated and aligned in order to promote the integration of transport and land-use planning successfully. Various areas for further research have been highlighted in the research. More attention should be given to how best the different acts/policies/strategies on transport and land-use planning might be consolidated into one Master Plan and how to mobilise resources to implement it.

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RESEARCH CLEARANCE FORM

EBE Faculty: Assessment of Ethics in Research Projects (Rev2)

Any person planning to undertake research in the Faculty of Engineering and the Built Environment at the University of Cape Town is required to complete this form before collecting or analysing data. When completed it should be submitted to the supervisor (where applicable) and from there to the Head of Department. If any of the questions below have been answered YES, and the applicant is NOT a fourth year student, the Head should forward this form for approval by the Faculty EIR committee: submit to Ms Zulpha Geyer (Zulpha.Geyer@uct.ac.za; Chem Eng Building, Ph 021 650 4791). NB: A copy of this signed form must be included with the thesis/dissertation/report when it is submitted for examination

This form must only be completed once the most recent revision EBE EIR Handbook has been read.

Name of Principal Researcher/Student: S P Boshielo Department: Engineering and Built Environment
Preferred email address of the applicant: pollyboshielo@yahoo.com
If a Student: Degree: MPhl Supervisor: Prof Roger Behrens
If a Research Contract indicate source of funding/sponsorship: N/A

Research Project Title: Integrated Public Transport Network (IPTN) as a mechanism to integrate land-use and transport planning

Overview of ethics issues in your research project:

Question 1: Is there a possibility that your research could cause harm to a third party (i.e. a person not involved in your project)?	YES	<input checked="" type="checkbox"/>
Question 2: Is your research making use of human subjects as sources of data? If your answer is YES, please complete Addendum 2.	YES	<input checked="" type="checkbox"/>
Question 3: Does your research involve the participation of or provision of services to communities? If your answer is YES, please complete Addendum 3.	YES	<input checked="" type="checkbox"/>
Question 4: If your research is sponsored, is there any potential for conflicts of interest? If your answer is YES, please complete Addendum 4.	YES	<input checked="" type="checkbox"/>

If you have answered YES to any of the above questions, please append a copy of your research proposal, as well as any interview schedules or questionnaires (Addendum 1) and please complete further addenda as appropriate. Ensure that you refer to the EIR Handbook to assist you in completing the documentation requirements for this form.

I hereby undertake to carry out my research in such a way that

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

Signed by:

Principal Researcher/Student:	Full name and signature	Date
	SHELA PAULINA BOSHIELO	25/02/2015
This application is approved by:		
Supervisor (if applicable):	R. BEHRENS	26 FEB 2015
HOD (or delegated nominee): Final authority for all assessments with NO to all questions and for all undergraduate research.	L. JUDGEES	10 Feb 2016
Chair: Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the above questions.		