

# **TRANSIT ORIENTED DEVELOPMENT IN THE SOUTH AFRICAN CONTEXT: AN ANALYTICAL REVIEW OF JOHANNESBURG'S RECENT URBAN POLICY AND STRATEGY**

**By**

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degree (specialising in Transport Studies)**

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## ABSTRACT

Globally, the growth trend of cities over the past century has been one of rapid outward expansion. It is no coincidence that this growth has coincided with the rapid uptake of the private automobile. There is now unequivocal evidence that the two phenomena are deeply interrelated. South Africa has not escaped these influences, but the picture is slightly nuanced. Apartheid spatial planning has defined the urban experience in contemporary South Africa. Many black people still live extraordinarily far from places of economic opportunity and are forced to commute using dissatisfactory public transport services over long distances, for many hours at high personal and household costs. Confronting the apartheid spatial pattern has consistently been at the forefront of urban policy in democratic South Africa. Transit Oriented Development (TOD) has gained much traction globally as a concept which can provide strengthened alignment between public transport systems and urban development patterns, fostering more sustainable and liveable city fabrics. TOD is increasingly being drawn on in South Africa as an approach to more sustainable and socially integrated development, evidenced through its explicit inclusion in the National Development Plan which calls for the 'internationally accepted principles' of TOD to be applied.

The overarching aim of the research is to interrogate how TOD is being understood in a South African context. The research seeks to bring the range of TOD international and local literature together to provide a thorough literature review on the topic. In depth South African insight will be provided by drawing on the case of Johannesburg's recent urban policy and strategy and an associated stakeholder interview analysis in an attempt to move beyond the rhetoric and gain important insights from potential TOD implementation stakeholders. Key research questions are: what are the lessons on offer from international experience?; to what extent is there evidence that these have been applied in developing a TOD understanding in Johannesburg specifically and South Africa more generally?; and ultimately taking into consideration the international experience, local insights and context, how is TOD being understood in South Africa?

The research is primarily literature review based. Thus, existing international literature detailing TOD principles, approaches, experiences and outcomes as well as the limited South African literature on the topic, including policy and strategy documents are drawn on to build and understanding of the details of the concept and how it is being unpacked in South Africa. A case study of the City of Johannesburg is carried out to develop a focused understanding of how TOD is being understood in South Africa. The case study comprises a literary review of the policy, strategy and planning documents of the municipality over the past decade. The literature review is supplemented by a stakeholder analysis of identified potentially important stakeholders in a TOD agenda. Fifteen stakeholders were contacted for interviews and eleven (n=11) interviews were eventually conducted. The combination of the international and South African literature, the Johannesburg policy analysis and the stakeholder insights are argued to provide sufficient information to answer the research questions.

An overview of the findings indicates that TOD has not proved to be a panacea anywhere in the world as of yet. It is far more complicated, costly and time consuming than current approaches to development. While the internationally accepted principles of higher density, mixed land use, pedestrian prioritization (and increasingly included income diversity) are relatively

straightforward to arrive at, the key lesson from the international literature is that understanding the detail of what these principles mean and how to realise them is more challenging. Context plays an important role in determining the details of TOD outcomes and the approach to how they will be achieved. Dealing with multiple stakeholder interests has been argued to be at the core of overcoming the many barriers which have been reported in TOD experiences. Bringing stakeholders together to collaborate, negotiate and formulate a joint agenda is critically important to TOD success.

An important finding is that TOD, even when focused on the developing world, remains highly formal in nature. There is very limited literature dealing with how TOD might begin to apply to the informal environments which are expected to persist and grow into the future in South Africa and the rest of the developing world. There are however some innovative TOD development approaches, providing capital investment in social facilities focused around transit to create great public spaces and places, taking place in informal areas in South America which offer valuable insights for dealing with the dualistic nature of South African cities.

In South Africa and Johannesburg more explicitly TOD has been identified as an approach to overcoming the extreme socio-spatial inequality inherited from apartheid. Such an understanding places inclusion at the heart of a TOD agenda which is arguably an interesting adaptation to the conceptual understanding of TOD and something which globally (even in the developing world countries) has not occurred as prominently. Of concern is that this adaptation does not seem to have considered and addressed the international experience highlighting the limited ability of TOD to accommodate poorer households. The report argues that it is clear that South African high level TOD understandings have been influenced by international policy circulation of the concept. The presence of the TOD term and narrow physical principles have manifested throughout South African policy and strategy documents to varied extents over the past eight years. However, it is evident from the research that even in the case of the City of Johannesburg, which has arguably taken far greater strides in developing the TOD concept than any other South African city, there has been an inability to incorporate lessons from the outcomes of international experiences into the development of detailed context specific strategies. Most alarming is perhaps the divergent views and differential understandings of the TOD concept expressed by the various stakeholders who were interviewed.

Given these lessons, it is argued that the City of Johannesburg's TOD plans are on the one hand over ambitious whilst on the other perhaps limited in their scope relative to the contextual realities and will struggle to achieve socio-spatial transformation. By this I mean that the idea to target three corridors and provide a highly formalised response to dense, mixed land use, pedestrian prioritisation along the corridors is perhaps a 'stretch too far' initially. By focusing efforts around a few identified stations and interrogating carefully the contextual realities to inform detailed sets of physical outcomes is perhaps a more strategic approach. Then I argue that there exists the opportunity to experiment with other types of TOD which might begin to expand TOD thinking beyond the conventional international approach to incorporate TOD around other modes and in poorer areas of the city. These too will require a set of strategically targeted station areas.

The research suggests that TOD understandings in Johannesburg, although adapted conceptually as an approach to overcome socio-spatial inequality, remain high level, fairly

generic, and are poorly informed by international experience; and vary significantly between different stakeholders. In this regard I argue that understanding has focused on TOD as a term and as a particularly generic property product and not enough emphasis has been placed on understanding the TOD process and what it might require politically, financially and institutionally to drive an adapted, context specific TOD action agenda. The implications of this limited understanding are that not enough has been done to facilitate the coming together of potentially important TOD implementing stakeholders. The risk is that these important role players will continue to invest in uncoordinated ways. Experience suggests that addressing this area is a priority.

If TOD is to be the prominent socio-spatial restructuring tool which it is being touted as then adaptation is required. Drawing on the lessons and analysis provided in the research I propose that the following multiple pronged TOD approach will best carry the socio-spatial restructuring agenda forward:

- Conventional TOD in areas where land markets provide the demand and private sector interest for TOD potential.
- Aligning more closely the efforts of affordable and subsidised housing provision by the state to the principles of TOD to be targeted in areas in close proximity to public transport.
- A spatially targeted investment strategy in areas of informality and poverty which focuses capital investment in social facilities around public transport stations and seeks to create exceptional public places and spaces.

This understanding expands TOD beyond the current international approaches but is argued to more effectively engage with broader urban policy objectives. Such an approach will require further research and exploration around each of these areas. What is clear is that any TOD agenda will require major long term political and financial support and most importantly improved and ongoing dialogue and collaboration between city building stakeholders.





extraordinarily far from places of economic opportunity and are forced to commute using dissatisfactory public transport services over long distances, for many hours at high personal and household costs (Behrens and Wilkinson, 2003). For the vast majority of urban dwellers this is the urban reality. While it must be acknowledged that the level of basic services provided to poorer areas across the country has dramatically improved (South African Presidency, 2014; COGTA, 2013, NPC, 2011), this improvement has largely entrenched the highly inefficient and unequal spatial patterns (COGTA, 2013).

Confronting the apartheid spatial pattern has consistently been at the forefront of urban policy in democratic South Africa. However, despite transformative intentions the apartheid spatial logic has stubbornly remained. Most recently, the National Development Plan (NDP) has reaffirmed the commitment to restructuring South African cities which are rapidly sprawling, resource intensive and highly unequal. Much of the spatial restructuring rhetoric in South Africa has focused on improved land use-transport integration. In this regard the compact city concept has featured consistently in post-apartheid urban policy. The Reconstruction and Development Programme (RDP) of 1994 made explicit reference to the role of more compact urban development and improved public transport to addressing apartheid geographies. Over time the importance of integrating public transport and more intensive urban development has become entrenched in urban policy. This is perhaps best highlighted by the NDP, when discussing the '*planning instruments*' which are critical to implementing a transformed spatial vision, one of which is to 'Strengthen the link between public transportation and land-use management with the introduction of incentives and regulations to support compact mixed-use development within walking distance of transit stops, and high-density developments along transit routes' (NPC, 2011: 286).

There has been an unprecedented level of investment in public transport across South African cities over the past decade. This investment has given rise to a new regional rail system in Gauteng<sup>1</sup>, called the Gautrain and Bus Rapid Transit (BRT) systems in Johannesburg (Rea Vaya) and Cape Town (MyCiTi) with many other cities set for phase 1 BRT completion in coming years. This investment has focused discussions around land use transport integration as the major operational finance implications of providing expensive and high quality public transport in sprawling, mono-functional, low density settlement patterns are beginning to impact heavily on the municipalities' finances. However, there are also important lifestyle and human behaviour elements which come into focus around land use transport integration discussions as effective outcomes depend arguably on the ability of fundamental shifts in the way people live, aspire to live and generally experience urban life.

## 1.2 THE THEORETICAL FRAMEWORK: TRANSPORT LAND USE FEEDBACK CYCLE

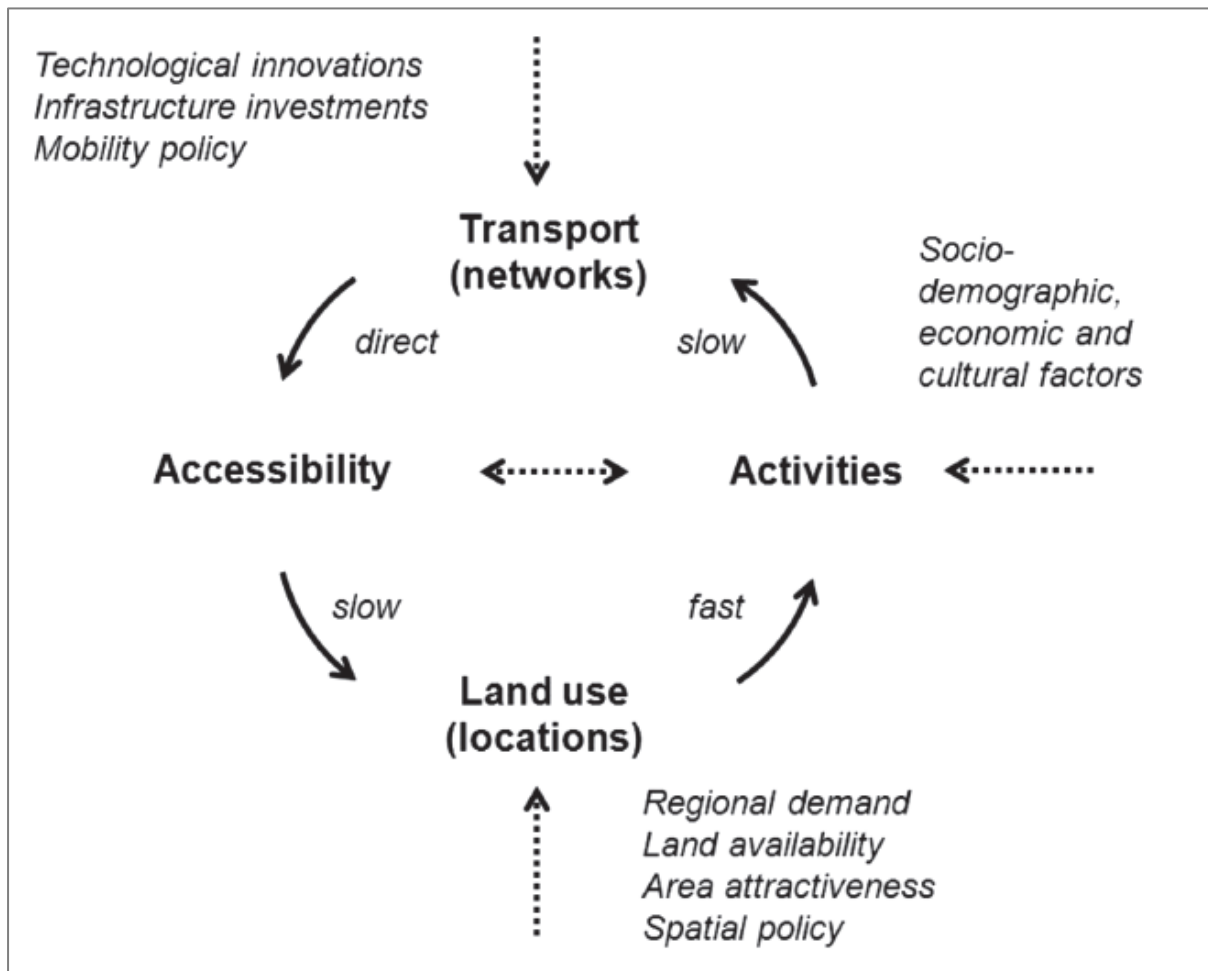
The imperative to strengthen land use-transport integration to achieve more sustainable urban spatial arrangements has gained much support internationally (Newman and Kenworthy, 1996; Cervero, 2001). Transport is a derived demand (Cervero, 2001) born out of the need for people to carry out their daily functions and activities spread across different locations. As such land use patterns and urban form are inextricably linked to transport. Newman and Kenworthy

<sup>1</sup> Gauteng is the most populous Province in South Africa and contains three metropolitan municipalities Johannesburg, Tshwane and Ekurhuleni.

(1996) illustrate the impact which the evolution of transport technology has had on levels of accessibility and in turn shifted land use patterns across cities over time.

The transport land use feedback cycle provides the theoretical frame of this research. Many authors have acknowledged the recursive relationship shared by land use and transport (Carlton, 2007; Dittmar and Ohland, 2004; Bertolini, 2012; Cervero, 2001; Newman and Kenworthy, 1996, Rodriguez and Tovar, 2013). This is the very understanding which underpins the Transit Oriented Development (TOD) concept and is important to briefly discuss.

The transport land use feedback cycle is essentially the understanding that any transport intervention provides and prioritises a certain level of accessibility which in turn leads to a particular land use response. As land use grows according to the access provided so a pattern of embedded activity emerges which then demands more access of a similar nature and leads to the expansion of a particular transport network, see figure 1. Transport and land use thus share a recursive relationship. They are mutually dependant.



**FIGURE 1: TRANSPORT LAND USE FEEDBACK CYCLE, AND BEYOND. EXTRACTED FROM BERTOLINI (2012)**

Rode et al (2014) highlight the relationship shared by density and transit use where they present empirical evidence of a positively correlating relationship between higher densities and transit use in a number of cities throughout the world. On the other hand cities with

significantly lower densities exhibit the highest use of the automobile, reinforcing the validity of the transport land use feedback cycle. Over time as technologies have advanced cities have adopted particular ways of investing in transport and supportive land use patterns, Newman and Kenworthy (1996) clearly illustrate the mass production of the automobile had a major influence on the nature of this relationship. These transport land use approaches are self-reinforcing and perpetuate what Rode et al (2013: 4) refer to as 'urban accessibility pathways'. Importantly, Rode et al (2013) illustrate that low density auto-oriented suburbs are the most energy intensive and have the greatest negative environmental and social impacts.

However, once the observed relationship is acknowledged and accepted, and safely assuming that the desired objective is a more sustainable transport land use relationship, the next issue is about how to reverse a sprawling, low density, auto-oriented trend and shift the urban accessibility pathways toward more sustainable trajectories? It is this context where the TOD concept finds its roots.

### 1.3 INTRODUCING THE TOD CONCEPT

TOD has gained much traction globally as a concept which can provide strengthened alignment between public transport systems and urban development patterns, fostering more sustainable and liveable city fabrics. It is essentially urban growth which is structured in such a way as to both support and depend on public transport for accessibility and mobility requirements. TOD was a term coined in the 1980s by an urban practitioner named Peter Calthorpe (Carlton, 2007). At the time there was a movement in urban planning which was concerned about the impact urban growth based on the automobile was having socially, environmentally and financially. In response urban practitioners began to advocate for a more sustainable growth based on principles of city building in the pre-automobile era, such ideas were termed smart growth, new urbanism or sustainable growth (Carlton, 2007). TOD is strongly associated with this set of emergent urban growth concepts (Essam and Khalil, 2010; Carlton, 2007; Wilkinson, 2006). The thinking was born in a context of major car dependency in North American cities which led to the proliferation of sprawling, mono-functional spatial patterns. Moving around such cities expends large amounts of fossil fuel based energy and leads to high levels of polluting emissions. The negative consequences of city growth dependant on vehicle access and mobility were receiving greater attention and seen as increasingly problematic. Calthorpe introduced TOD as a way of moving back towards city building practices which predated the automobile. From this perspective he argued that the concepts and ideas were not new but rather had been lost over time and needed to be reintroduced (Carlton, 2007).

Simply put TOD is a form of development which is structured around and functionally connected to public transport systems. What this essentially means is that people occupying TOD developments are able to carry out their daily activities using public transport or walking with limited (ideally no) use of private cars. The concept was originally focused around rail and light rail systems but increasingly commentators are arguing that Bus Rapid Transit (BRT) systems present major opportunities for TOD (Cervero and Dai, 2014; Cervero, 2013; Cervero and Kang, 2011; Currie, 2006; Hook et al, 2013)

There is a large body of literature predominantly based in the context of North America, but growing throughout other parts of the developed and developing world, which deals with the principled understanding of TOD. The physical aspects (in principle) of TOD are well covered

and will be elaborated on in this dissertation along with some of the more complicated and complex issues of what they have actually meant in practice.

The TOD term has arguably succinctly captured a range of sustainable growth principles and neatly packaged them into a single term which in turn has made it easier to promote improved land use public transport integration. There are clear signs that the term has proliferated across urban growth thinking in the developing world. This research is an attempt to interrogate the understanding of the term is unfolding in a South African context.

#### 1.4 RESEARCH FOUNDATIONS AND INITIAL APPROACH

Wilkinson (2006) provides some of the earliest intellectual engagement with the TOD concept in South Africa and highlights that the context in which TOD emerged is different to that of the current context of South African cities. Thus, prompting a suggestion that perhaps an adapted understanding of TOD would be required in South Africa.

Drawing on Wilkinson's (2006) analysis it is evident that TOD in South Africa will have to grapple with a somewhat unique context (mentioned above but unpacked in more detail in Chapter 3). Similar to North America there are clear signs of an auto-oriented transport planning paradigm in South Africa, there are also similar socio-economic conditions faced by much of the developing world and additionally there are the socio-spatial impacts of apartheid. The applicability of TOD in respect of these contextual elements needs to be considered.

However there are clear signs that TOD has been drawn on explicitly as a concept in South African growth and development thinking. Perhaps best highlighted by the NDP which states 'new urban development and infrastructure investments should be focused around corridors of mass transit and around existing and emergent economic nodes, applying internationally accepted principles of transit-oriented development' (NPC, 2011: 285). However, the NDP does not provide any further detail on what is understood by internationally accepted principles of TOD. Furthermore, the work of Wilkinson (2006) provided an argument that adaptation of the TOD concept is required to respond more effectively to the dualistic transport nature of the South African context and serve broader socio-spatial restructuring objectives. The clear adoption of the internationally based TOD term in urban policy and the idea that the concept, if adapted, can contribute towards overcoming the socio-spatial divide in South African cities have been foundational influencing aspects for framing the research.

Nowhere more so has the concept been drawn on in South Africa than in the urban policy and strategy discourse of the City of Johannesburg. The 'corridors of freedom' vision introduced in 2013 is based explicitly on the TOD concept and is the strategic focus of the municipality's Integrated Development Plan (IDP). This presents arguably the most advanced TOD thinking in South Africa but also suggests that the City of Johannesburg is placing serious developmental emphasis on achieving effective TOD outcomes. It is for this reason that Johannesburg has been identified as a case study in the South African context to get a detailed insight as to how the TOD concept is being understood. The research will move beyond rhetoric and seek to understand how various TOD stakeholders are interpreting and understanding the concept. The rhetoric is yet to translate into significant physical outcomes, and as such the research is unable to reflect on actual South African TOD implementation.



Some limited writing exists on how TOD has been conceptualised and implemented in parts of the developing world mainly in Asia and South American contexts and more recently there are some reflections on the implementation attempts in these contexts. Comparatively there is a limited amount of literature which has emerged in a South African context, but with increased usage of the concept in urban developmental thinking there seems to be a growing literary base on the topic. It seems there are many international learning insights available which can be drawn on to inform TOD thinking and implementation in the South African context. The research seeks to contribute towards building the knowledge base of TOD by analysing the extent to which the initial TOD efforts in South Africa are showing signs of applying lessons learnt internationally and supplementing this with insights provided by local professionals who are potentially important TOD stakeholders.

The concept of learning is an important component of the dissertation. Campbell (2009) argues that learning from other urban experience is proving to be essential in a globalised world where certain challenges are similar. The type of learning is essential however in that there are a range of lessons to extract from other urban experiences. The premise of the dissertation is that there are many lessons to learn from TOD experience internationally. A glance at local policy suggests there is evidence that learnings regarding the conceptual benefits TOD offers have taken place in South Africa. However, the method of importing practice has been criticised in South Africa's approach to BRT implementation<sup>2</sup> and thus a caution might be required regarding TOD.

## 1.5 THE AIM OF THE RESEARCH

The overarching aim of the research is to interrogate how TOD is being understood in a South African context. Further the research seeks to bring the range of TOD literature together to provide a thorough literature review on the topic but also to move beyond the rhetoric to gain insights from potentially influential TOD stakeholders on how they understand or perceive the concept. The hope is that the research will contribute towards a more detailed and context appropriate TOD understanding in South Africa. The overarching research question can thus be framed as *what does a combined analysis of TOD literary insights, Johannesburg's 'Corridors of Freedom' experience and various stakeholder articulations begin to suggest about how TOD is being understood in a South African context?* The following set of sub-questions has been established to ensure the research process adequately answers the overarching research question:

- What are the 'internationally accepted' principles of TOD?
- What lessons are provided from international TOD implementation experience?
- How does available literature assist in understanding the dualistic nature of South African cities?
- How has the concept been understood in the South African context to date?
- How has TOD been interpreted in the City of Johannesburg?
- Who are critical TOD stakeholders in Johannesburg?
- How have the key stakeholders in Johannesburg understood the concept in general and their respective roles in driving TOD forward more specifically?
- What are understood to be some of the major barriers to achieving TOD in Johannesburg?

<sup>2</sup> <http://www.citylab.com/commute/2013/03/limits-bus-rapid-transit-cape-town-case-study/4968/>



- Is there evidence that international lessons have been applied to an adapted TOD thinking in South Africa?

## 1.6 RESEARCH METHOD

The research is primarily literature review based. This is because there have been few TOD projects (as per the principled definition) implemented or attempted to be implemented in South Africa to date. However, it is clear that TOD is gaining prominence in South African urban developmental thinking. Thus, existing international literature as well as the limited local literature including policy and strategy documents will be reviewed. The NDP clearly articulates an intention to achieve internationally accepted TOD principles in South Africa. Thus, it was understood that international literature would play an important role in the research process. The international literature review was initially framed by two questions drawn on by background reading 1) what does it mean to implement 'internationally accepted principles of TOD' as outlined by the NDP? 2) How does the literature on TOD internationally assist in dealing with the dualistic nature of South African cities as articulated by Wilkinson (2006)? Following an extensive literature review it became immediately clear that understanding the 'internationally accepted principles of TOD' was a relatively straightforward process but implementing such principles is where the more critical challenges exist. As such the literature review moves beyond providing a perspective on the internationally accepted principles of TOD and discusses lessons learnt in attempting to implement these principles internationally. The literature review attempts to provide a critical discussion on how relevant international experience is to a South African context, through a South African literature review which includes public policy and strategy documents developed at all spheres of government. The review also seeks to identify gaps in the available literature or areas which the South African context demands interrogation but have not been covered in TOD literature.

The research then draws on the case of Johannesburg to provide a practical basis for the application of insights and lessons drawn from the broader literature review. The case study takes the form of a detailed policy, strategy and plan analysis of the City of Johannesburg's relatively long standing TOD approach. However, a set of qualitative interviews (n=11) were conducted to supplement the policy analysis. Informed by the broader literature review, the interviews deliberately targeted a variety of stakeholders in both the public and private sector.

The literature review clearly articulates the importance of a range of stakeholders in driving TOD projects to successful implementation as highlighted by Belzer et al (2004:43) 'like all other complex assets, no one agency can make TOD work by itself'. As there is a generally wide spread view across South Africa that TOD holds much promise in achieving the urban developmental goals stated in key urban policy, the research process involved a set of targeted interviews with a sample of stakeholders who are perceived to be crucial to the implementation of TOD. It is believed that this insight would provide an important supplement to interrogating how TOD is being understood as TOD is ultimately dependent upon a number of stakeholders' understandings and actions. It is argued that providing an analysis of a single stakeholder's views (the municipality) would be deficient.

Before embarking on an interview process the requisite university procedures and ethics clearance forms were completed and approval was granted (The ethics clearance and interview letter can be found in Annexure A). Then the possible stakeholder groups were identified by

drawing on international literature and knowledge regarding the South African context. Following which, individuals representing stakeholder groups were identified and sent a set of broad questions which would guide a qualitative open ended interview. Initially a total of fifteen people were targeted with letters requesting a face to face interview. Of the total only eleven people responded and ten were interviewed. Representatives from both public sector organisations as well as private sector organisations who were deemed to be prominent role players in TOD were interviewed. This sample is not comprehensive and admittedly there are many other stakeholders whose views have not been represented in this research. Nine face to face interviews were conducted while one response was email based. The interviews were then synthesised according to questions asked and objectives of the research.

This is a potentially useful contribution to the area of study as to my knowledge this research is the first attempt to understand what a range of potentially TOD influential stakeholders are thinking with regards to the concept in South Africa.

It is believed that the literature review along with the stakeholder interviews will provide adequate data and insight to answer the research question.

## 1.7 STRUCTURE OF THE DISSERTATION

The report will be structured as follows. **Chapter One** is the introduction, where the motivation and background to the research is discussed and the research topic is introduced and outlined. The research method and the outline of the report are also discussed in this chapter.

**Chapter Two** provides a review of international literature on the topic with the aim of distilling the 'internationally accepted principles' of TOD along with the lessons learnt around implementation efforts to date. The chapter also assesses the extent to which available literature assists in dealing with the dualistic nature of South African cities. The international literature by nature will thus provide opportunity for learning insight and critical reflection.

**Chapter Three** covers a South African based literature review intended to provide insight as to how the concept has been interpreted conceptually in the South African context. The South African based literature review will focus on existing policy, academic and practitioner engagements providing an opportunity to reflect on the extent to which TOD has been included in South African urban growth and development thinking and how it has been understood.

**Chapter Four** will focus on the Johannesburg case providing a detailed insight on how TOD is unfolding and being understood in South Africa. A discussion on the TOD based policy evolution will be followed by a critical analysis of the 'Corridors of Freedom' visioning and planning documents. This is followed by a stakeholder analysis which provides insights from various stakeholders' understandings and views of TOD.

**Chapter Five** provides an analysis of understandings of TOD in South Africa and in Johannesburg more specifically. It discusses the extent to which local understandings are adopting international conceptualisation and lessons or adapting the concept to better suit the local context and targeted objectives.

**Chapter Six** discusses key findings of the research report and concludes with a series of recommendations on areas required for consideration moving forward.

## 2 THE CONCEPTUALISATION AND IMPLEMENTATION LESSONS OF TOD: AN INTERNATIONAL REVIEW

### 2.1 INTRODUCTION

This chapter will provide a review of international literature on the topic with the aim of distilling the ‘internationally accepted principles’ of TOD along with the lessons learnt around implementation efforts to date. It further aims to assess the extent to which available literature assists in dealing with the dualistic nature of South African cities and in so doing seeks to identify potential gaps in the literature relative to the South African context.

The literature will be reviewed specifically in relation to building a better understanding of TOD in a South African context. Wilkinson’s (2006) argument that the dualistic nature of South African cities clearly calls for differentiated approaches to TOD provides one of the framing questions which the literature review seeks to gain insight into. The second framing point comes from the NDP which calls for the application of ‘internationally accepted principles of transit-oriented development’ (NPC, 2011: 285). This provides two strategic framing questions for the international literature review. What does the application of ‘internationally accepted principles’ of TOD entail? And, how does the existing literature enable us to better understand how the TOD concept could be adapted and/or applied in the dualistic context of South African cities?

This chapter also identifies gaps in the literature and explores the developing world urban context in more detail. There are interesting land use public transport integration efforts, often reported as TOD, which have materialised in these contexts and are worth discussing. This broader literature will prove useful for insight into developing world thinking and assisting in deepening understandings around adaptive possibilities of the TOD concept.

More specifically this chapter will seek to answer the following research questions:

- What are the ‘internationally accepted principles’ of TOD?
- What lessons are provided from international TOD implementation experience?
- How does available literature assist in understanding the dualistic nature of South African Cities?

### 2.2 THE ‘INTERNATIONALLY ACCEPTED PRINCIPLES OF TOD’

The NDP refers to a set of ‘internationally accepted principles’. Cervero (2006:1) argues that ‘TOD is a straight forward concept: concentrate a mix of moderately dense and pedestrian friendly development around transit stations to promote transit riding, increased walk and bicycle travel, and other alternatives to the use of private cars’. While there is no set definition for TOD (Renne, 2005, Transport Research Board, 2004; Queensland Government, 2010), analysis of the available literature suggests that there are certain elements which have become relatively constant across all TOD understandings. The literature<sup>3</sup> highlights that the following set of physical characteristics or principles are commonly listed for TOD:

<sup>3</sup> The literature referred to includes the vast majority of literature dealing specifically with TOD referenced in this report.

- [illegible]

This message arguably begins to raise the complex nature of TOD which moves beyond a simple understanding of a set of physical normative principles.

In attempting to gain an understanding of what the application of ‘internationally accepted principles of TOD’ might be, it is argued that the detailed outcomes of TOD efforts present a far richer understanding in this regard. I take the perspective that the physical principles listed above are not sufficient in understanding the internationally accepted principles, as there does seem to be a far richer understanding of what is required to achieve TOD principles which emerges when the details are examined. Implementing TOD is deeply challenging and complex and is arguably where much of the focus on TOD is required, perhaps expressed clearly by Suzuki et al (2013:1),

‘The mechanisms for successfully integrating transit and urban development are complex. The multitude of factors involved includes inherent characteristics of a city (for example, natural and historical conditions); governance structures; institutional settings; public sector initiatives and actions (for example, transit investments, planning regulations, tax policies, and financial incentives); financing instruments; and market responses.’

The review of international literature will attempt to distil some of the lessons and insights provided around the complex and challenging nature of TOD projects. These will be discussed relative to what they might mean for the South African context.

## 2.3 LESSONS FROM INTERNATIONAL EXPERIENCE

This section will discuss important lessons which have emerged from attempts to implement principles of TOD. Broadly, lessons learnt from the attempts to implement TOD can be categorised as the more technical insights and uncertainties around the physical principles discussed previously and the ‘softer’ more institutional issues which surround land development dynamics. These issues however cannot be neatly isolated from one another and are deeply interconnected. It is believed that assessing each of these issues in relative detail will highlight this interconnectivity.

There are inherent differences in the manner in which political systems and institutional arrangements operate as well as the way in which land and property markets function across all countries. Furthermore given the historical spatial context the dualistic nature of South African cities arguably calls for a differentiated TOD responsive in areas displaying different contextual elements. In many instances insights from international experience are valuable but awareness about the specific contextual realities must be applied to thinking through these issues in the South African context

### 2.3.1 THE PHYSICAL CHARACTERISTICS OF TOD

Transit oriented development is by its very nature a desire to effect physical implementation. The broad physical characteristics of TOD have already been outlined above and are relatively straight forward to understand conceptually. These are a desire to achieve in combination, higher density, mixed land use, improved pedestrian connectivity to public transport stations (developing quality pedestrian public realm), reduction in parking provision and diverse accommodation for mixed income groups. This section will discuss each of these issues in an attempt to distil a more detailed understanding of what they have meant internationally.

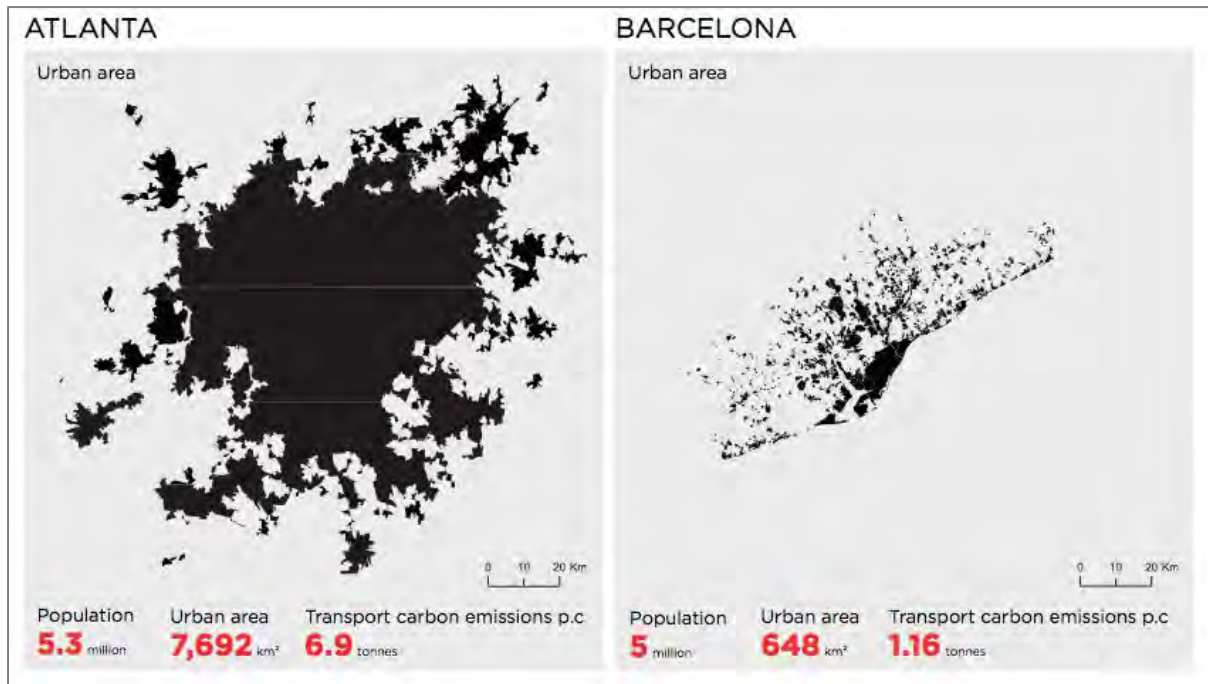
### 2.3.1.1 Density

There is generally widespread support for the idea that development which is transit-oriented should be relatively high density. However, there is less consensus and clarity on what the exact densities for TOD should be and how they should be measured.

#### 2.3.1.1.1 The counter view

Before discussing the details it is important to acknowledge that there are some arguments against the requirement for higher density and effective public transport. Engaging with these perspectives is useful in providing a balanced discussion before embarking on what higher density means. Mees (2010) offers a different perspective arguing that density is not a necessary precondition to efficient transit use. Rather he argues that a well operated suburban bus system can serve these environments effectively and generate similar ridership experienced in dense cities around the world (Grescoe, 2012). The real challenge with Mees' argument however is that suburbs as we have come to understand them were not built for public transport. His proposition has one fundamental flaw, the cost of building and maintaining the road network to service suburban environments is exceptionally high when compared to the transport infrastructure costs to service dense environments and the potential capacities which public transport infrastructure can service. Daisa (2004) highlights this through comparing the long term costs of building roads for low density sprawling environments versus those associated with dense urban environments. In a sprawling low density environment where land uses and activities are inherently more dispersed across space, the car will remain the most attractive form of mobility (Bertaud, 2004).

This is perhaps well illustrated by the comparison which Bertaud (2004) conducted on Atlanta and Barcelona (and has subsequently been utilised and expanded by other researchers and analysts, see figure 2), highlighting clearly the challenges of providing transit in a sprawling environment. The cost alone of running an extensive bus service in such a context relative to the revenue it will generate and the road maintenance it will demand will not be viable. While Bertaud (2004) also makes a pertinent argument that in many cities the spatial structure is fixed for the foreseeable future and will not be removed, in a developing world context where rapid urban growth is projected, the need to provide a different way of building cities is clearly required. If growth can be accommodated within a more compact transit oriented framework which requires less outward expansion and the construction of less roads, the benefits seemingly are clear (Rode et al, 2014, Bertaud, 2004; Lefèvre, 2009, Daisa, 2004). This is made that much more complex given the projected nature of urban growth in the developing world will be largely poorer, unskilled people likely to settle in informal settlements, this will be discussed in more detail later in the report.



**FIGURE 2: COMPARATIVE SCALE ANALYSIS OF BARCELONA AND ATLANTA (SOURCE: LONDON SCHOOL OF ECONOMICS CITIES, 2014)**

From a transport land use feedback cycle perspective it makes little sense to build automobile oriented suburbs and then attempt to retrofit an expansive urban bus system into such an environment. Provocations of the nature of Mees are narrow and exclude too many variables which automobile oriented suburban areas and lifestyles generate. In essence the extent to which activities and land uses are dispersed across space drives travel demand, influencing a more compact configuration of such activities means that more activities and land uses can be accessed in a much smaller area. This is predominantly why density and greater levels of transit use are argued to go hand in hand (Bertaud, 2004, Suzuki et al, 2013, Daisa, 2004).

#### 2.3.1.1.2 Higher density: what does it actually mean?

The concept of urban density is not easily defined and many authors argue that it is used and understood differently (Boyko and Cooper, 2011; Doherty, et al, n.d; Cheng, 2009; Roberts, 2007). This makes the concept in itself unclear. Some authors argue that urban density in theory encompasses a wider range of aspects than the population and unit densities that are normally recorded (Roberts, 2007). Roberts (2007) goes further to argue that urban density could in fact encompass a range of different aspects found in urban areas, I argue that these could well capture all of the other areas of TOD which could fall under a density understanding. However, for purposes of speaking to each of the principles the more mainstream understandings of density (population/area, unit/area and Floor Area Ratio (FAR)<sup>6</sup>) has been focused on in this report.

The reason for higher densities is often linked to financial viability of services, the more people using the service the greater the fare-box revenue and the less subsidization required. The other

<sup>6</sup> According to the density atlas these are the three most widely referred to urban densities but can also report different aspects of the term <http://densityatlas.org/measuring/>

critical argument and linked to the financial perspective is that more people using transit drive less frequently which reduces vehicle based pollutants, congestion levels and obesity. While density doesn't necessarily translate directly into transit use, there is convincing evidence that dense environments lend themselves to increased transit use and sprawling environments to more frequent use of the private car (Rode et al, 2014, Bertaud, 2004; Lefèvre, 2009, Daisa, 2004).

Suzuki et al (2013) make the case for articulated densities. They argue that city wide densities can be misleading when attempting to understand the relationship between transit and land use. The reasons are perhaps best highlighted by the density profiles of South African cities where the highest densities are in peripheral locations (SACN, 2011b) which are often severely underserved by transit infrastructure and services. This means that while the average densities of Johannesburg are very similar to Curitiba in Brazil, often touted as a developing world land use transport integration outlier, much of the highest urban density in Curitiba is structured in corridors along the BRT system (Bertaud, 2004).

In South Africa the transit-oriented densification impetus has been closely linked to combating the inefficient and unequal spatial forms inherited from apartheid. More recently, as city governments have become responsible for public transport operations, densification around transit has focused on financial sustainability. While there remains much contention about the nature of investment made, predominantly in BRT systems in cities, it can be argued that city governments have in many ways been forced to think more carefully about public transport land use integration as a result and, this is very positive.

There seems to be an established argument however, that density levels are dependent on specific station precinct contexts (Greenberg, 2004, Bertaud, 2004, Dittmar and Poticha, 2004, Suzuki et al 2013). Dittmar and Poticha (2004) go further to argue for a variety of typologies for different contexts traversed by a transit line. Essentially the premise is that it is simply not feasible to expect the same outcomes in different areas, with different cultural aspects, different land market functionality and different community demands. The challenge with increasing density levels often exists in the tension between what is desired (by planners and transit agencies), what is allowed (by communities) and what is feasible (determined by developers and financiers). Some research has been conducted around the densities required to ensure effective transit use. The premise is relatively straightforward in theory, the higher the density of people and activities in close proximity (usually a 10 minute walking distance of 800m according to Bertaud, (2004)) the greater the use of the transit system and with more people paying to use the service the greater the financial sustainability of the system.

A number of authors have provided insight into the densities required to ensure efficient use of a public transport system. In a synthesis of studies on the densities required to support transit use carried out by Bertaud (2004) he argues that there is consensus that around 30 people per hectare (p/ha) is the appropriate threshold for transit. The study does not unpack what particular mode 30p/ha refers to as presumably higher capital and operational costs associated with larger capacity transit require higher thresholds. Greenberg (2004) highlights the range of densities which have been achieved across TOD projects in the United States these are measured according to units/ acre (gross and net) or Floor Area Ratio (FAR). These various measures make it difficult to compare densities from one project/area to the next. Furthermore

it is not clear what the most adequate measure of density for land use transport integration is. Of eleven projects assessed in *'The New Transit Town: Best practices in Transit-Oriented Development'* the density range is widely varied. The comparative table<sup>7</sup> does not link the densities to transit use but does provide the number of parking bays supplied per project, which is useful as one can make inferences regarding transit use. The projects vary in size, this along with the range of measures make it difficult to draw a conclusion as to what standard density targets might be. Dittmar and Poticha (2004) outline that different densities are required for different station typologies. They provide the density in units/acre<sup>8</sup> and suggest that urban downtown (city centres) require a minimum housing density of 148 units/ha, urban neighbourhood 50 units/ha, suburban centre 124 units/ha, suburban neighbourhood 30 units/ha, Commuter town centre 30 units/ha and a Neighbourhood transit zone 17 units per/ha.

This analysis by Dittmar and Poticha (2004) points to an important overarching point about TOD, that each station precinct requires differentiated and context specific responses. 'Regions are sophisticated places with a multitude of conditions to serve. The types of strategies that might be appropriate in older neighbourhoods close to downtown are certainly different from those that might work in suburban contexts, even with similar density goals.' (Dittmar and Poticha, 2004: 33). In the American context Dittmar and Poticha (2004) have argued that a one size fits all approach to achieving TOD on different sites is not useful. They go on to suggest that a definition for TOD which moves beyond the physical dimensions and acknowledges the complexity which exists across different locations which transit systems traverse will be more effective. This understanding is arguably of particular importance to South African cities as the urban condition varies significantly across space. There are areas within South African cities where land market conditions are established and private sector investment is prominent. Then there are areas which are perhaps more challenging, suburban areas, peripheral poor township areas where most of the people who are most in need of improved transport services reside. It is thus critical that across these varying contexts appropriate TOD strategies are developed. However, it is not certain how such measures relate to p/ha, unit/ha and FAR understandings, making it difficult to draw clear comparisons and provide a clear guide in terms of minimum density required for transit viability. Density is the one area where significant detailed research is emerging in relation to TOD in South Africa.. These will be discussed in more detail in Chapter 3 of the report.

It is arguably important to think about density in the short, medium and long term as perceived 'feasibility' will shift over time. Understanding the carrying capacity of the overall transport system is critical for informing long term density goals. However, in the short term transit carrying capacity might not be the most prominent informant. Density in TOD settings will most probably require an incremental approach.

The above analysis arguably highlights the uncertainty which exists around the exact densities which are required to serve public transport system efficiently. What is argued to be clear however is that denser environments which are served by high quality public transport services ensure greater public transport modal share. It begs the question of how much is too much and

<sup>7</sup> Table included as an annexure

<sup>8</sup> Unit/acre has been converted to unit/ha for purposes of this report so that density measures can be compared

how much is too little and importantly why? These are the questions that South African cities need to grapple with if they are to ensure effective densities in TOD areas. Greenberg (2004) provides a simple argument that station precincts have to be denser than other neighbouring areas. Would such a measure prove sufficient? Hendricks et al (2005) indicate that urban form is one of many aspects which impact on people's decisions to use transit, as such density alone is not enough to ensure more sustainable travel decisions are made. The important role of Travel Demand Management (TDM) has been well documented as a critical ingredient to achieving successful TOD and more sustainable travel broadly (Litman, 2015 and Cervero and Kang, 2011). TOD is often included as a component of a TDM strategy. While TDM has been argued to be critically important to achieving shifts to sustainable travel patterns it will not be discussed in this report.

Establishing a functional density target from a technical land use transport relationship perspective is relatively challenging. However, this cannot be the only variable which influences density targets. Many authors have highlighted a number of other challenges in achieving higher densities. Some of these are the higher costs of densifying well located land (Suzuki et al, 2013, Sussman and Gilat, 2002), lengthy delays in development driven by stakeholder and process complications (Belzer and Autler, 2002), the planning system obstacles which are faced (Daisa, 2004, Cervero and Guerra, 2011) and the strong resistance from existing communities (Dittmar and Ohland, 2004).

All of these aspects need to be taken into account when establishing density targets and an incremental understanding to achieving such targets might well be important. The point being made here overlaps with a later section on the multi-stakeholder nature of TOD. There are a range of different perspectives which influence the realization of higher density. Developers will have their own perspectives on the extent to which land can be intensified, effected communities will also have their particular understandings as to what the best level of development for their particular area should be, planners will have a view on the most liveable urban densities and transit agencies will want to maximise revenue. Dittmar and Ohland (2004) illustrate that where various stakeholders are actively included from the beginning of the process visions and plans can be negotiated and agreed and will produce more effective outcomes. This is arguably especially the case in countries with highly democratic and participatory planning requirements and processes. The City of Johannesburg has faced the consequences of excluding other stakeholders in goal setting and plan-making on a number of occasions which has ultimately compromised projects. Such examples include the introduction of a density bonus scheme for developers in 2007 which was never taken up<sup>9</sup> as well as resistance to the BRT along Oxford Road<sup>10</sup> and more recently the resistance of densification proposals along the BRT corridor<sup>11</sup>. This will be discussed in more detail later in the report. Based on the literature review it is difficult to provide a position on what densities would be

<sup>9</sup> These are the admitted statements that planners from the City of Johannesburg responsible for implementing the concept continue to make regarding the poor uptake from private investors

<sup>10</sup> As a first year urban planning student in 2007 I attended a public meeting on the first phase of the original BRT plan intended to run along Oxford Rd, phase 1 was later reverted to Soweto and the Oxford route changed to Louis Botha Avenue. There is anecdotal evidence that the property owners associations surrounding the Oxford route were instrumental in this shift.

<sup>11</sup> At a meeting attended for the research the consultants drafting the corridors of freedom plans indicated that communities had resisted the proposed densities and that they have subsequently been reduced.

conducive in South Africa. However, it is argued that the range of aspects impacting densification need to be considered when establishing density targets for TOD projects. As such it is clear that the notion of 'higher density' requires a more detailed context specific analysis across a public transport system. Litman (2015:62) provides a literary overview of the relationship between land use and transit which indicates clearly that density is only a single component of promoting increased transit use where he states,

'Care is needed when evaluating the impacts of specific land use factors. Impacts vary depending on definitions, geographic and time scale of analysis, perspectives and specific conditions, such as area demographics. Most factors only apply to (a) subset of total travel, such as local travel or commute travel. Density tends to receive the greatest attention, although alone its travel impacts are modest. Density is usually associated with other factors (regional accessibility, mix, transport system diversity, parking management) that together have large travel impacts. It is therefore important to make a distinction between the narrow definition of density as an isolated attribute, and the broader definition (often called compact development) that includes other associated attributes.'

This perhaps makes the important case for why it is so critical to consider the other principles which TOD encompasses in greater detail. Also perhaps important to note is that compact development more broadly aligns potentially well to the broader inclusive intent of South African urban policy and not only greater transit ridership.

### 2.3.1.2 Land use distribution

Mixed use is an essential element of TOD because it creates a series of origins and destinations along a public transport route (Dittmar and Ohland, 2004). As land use drives transport demand, mixed use ensures that multiple trips in multiple directions occur throughout the day, it keeps trips shorter resulting in greater passenger attrition. Providing improved revenue collection rates for transit and providing higher average trips on the transit system throughout the day (Litman, 2015).

However, mixed land use properties are inherently more complex to develop and remain less attractive to developers (Parzen and Sigal, 2004; Rabianski, et al, 2009 and Lemont, 2014). This is one of the greatest challenges of implementing principled TOD projects<sup>12</sup>. Carlton and Fleissig (2014) in an American study highlight that often existing developers have very limited experience with developing mixed use developments impacting on the awareness of real costs and processes associated with TOD projects. The same could arguably apply in the South African context where private developers predominantly supply single use developments to the market and have significantly less experience with mixed use (let alone TOD) projects.

Particularly the challenges are largely financial in that it is well documented that mixed use developments take longer and are more complex to achieve which ultimately makes them more expensive than single use developments (Parzen and Sigal, 2004 and Rabianski, et al, 2009). Adding to the challenge is that lenders typically do not finance mixed use projects as they are difficult to securitize<sup>13</sup> and trade in secondary markets, thus mixed use developments normally

<sup>12</sup> Principled TOD refers to developments which exhibit the physical characteristics outlined earlier.

<sup>13</sup> 'Securitization' is a process that occurs when a group of similar financial assets are pooled together as collateral for securities which can then be traded in financial markets. In this way lenders have traditionally pooled together office, retail and residential but a mix of these is more complex to securitize.

require a range of different financiers and sources of funding (Lemont, 2014). The Melrose Arch development in Johannesburg is a mixed use precinct developed by a single developer and is underpinned by some of the new urbanism principles (very similar to those of TOD) but importantly is not served by any form of mass transit thus relying on a large three level parking basement to ensure access. Despite the lack of transit operator stakeholder interest McDonald (2010) highlights that complexity, longer time frames and financing challenges were major challenges to overcome in realizing the Melrose Arch development. What this study highlights is that mixed land use developments showcase challenges even when targeted at the wealthier car driving population, delivering them for a mixed income audience would intuitively be even more challenging.

The land and property market can also provide an obstacle in achieving the required level of land use mixes. For instance in a particular location where the land market is well established and land values are high, developers have the tendency to opt for commercial development, be it office or retail and not residential as the returns are often perceived to be better (or only feasible) for such uses (Harvey and Jowsey, 2004). Stations in these environments often require large levels of parking to accommodate people who have to drive from outside the immediate area to access the station. Often this compromises the quality of the pedestrian environment. This has arguably been the case around the Gautrain stations in Sandton and Rosebank. This land use arrangement does not support the transit system as optimally as is possible by spreading origins and destinations to a certain degree throughout the network. Belzer et al (2004) argue that strong facilitation on the part of the local government is required to ensure that more effective land use mixes are achieved. This requires a perspective on the current land market and a detailed understanding of existing uses by local planning authorities.

Scale is important to consider when thinking about TOD. No one single development will have the desired impact on travel behaviour. Arguably more important is how the system provides access to a number of land uses throughout a region (Daisa, 2004, Brooks, 2010). Sussman and Gilat (2002) have argued that TOD success is dependent on system wide implementation across the entire public transport network while Suzuki et al (2013) have argued that it is better to focus on a selected group of stations and concentrate TOD development efforts to ensure effective outcomes. 'In many instances, planning efforts should be devoted to developing or redeveloping no more than a handful of rail and BRT stations, in order to allow resources to be concentrated effectively. Doing so increases the odds of a "win-win" arrangement in which both public and private interests can co-participate in the benefits new transit investments yield.' (Suzuki et al, 2013: 3).

The City of Johannesburg seems to have opted for neither of these in their TOD strategy, but rather focused on defined portions of the BRT system termed 'corridors'. This will be discussed in more detail later in the dissertation. Corridor development potentially represents another strategic approach to achieving regional TOD growth. However, from the perspective of Suzuki et al (2013) the corridor approach might be over ambitious.

Such debates point to issues around the regional impact of TOD. Bertaud (2004) highlights the challenges associated with polycentric city forms and transit use. The fundamental point is that it matters less how far one lives from the transit station and more about where and what the transit system gives one access to. In a polycentric city there is less likelihood that the transit

system will provide access to a high proportion of land uses and specific activities across the city. This is especially the case in cities where urban growth has been auto-oriented, as is arguably the case in the growth of South Africa's polycentric cities (highlighted in the introductory chapter).

The so called network effect concept becomes exceptionally important in thinking about the extent to which people will demand to use public transport. Should the public transport network not provide access to a range of land uses in the city then the attractiveness and practicality of such a system is reduced. South Africa faces many challenges from a transport operations perspective around achieving the network effect. The perspective of Dodson, Mees and Stone (2011) when detailing the impacts of the network effect arguably highlights the importance of a coherent, integrated public transport system operating across South African cities. Access to infrastructure alone is not enough as if the services provided are not integrated, reliable, safe and frequent (as is the case generally across South African cities) then ones access levels across the network is restricted.

The crowding in of dense housing along a particular public transport corridor might not ensure that private vehicle travel demand is curbed. Without adequate investment in the range of land uses which allow people to fulfil daily living requirements around public transport stations, the expansive travel demand patterns (often off the public transport network and most effectively accessed by private vehicles) will continue to exist.

Thus, mixed land use development activities have to take regional perspectives. Perhaps what the literature suggests is that it might not be feasible for developers in the short –medium term to develop mixed land use projects at scale (Parzen and Sigal, 2004). It might however be feasible to assemble a range of different land use projects on adjacent sites and achieve mixed land use at the precinct and regional scale while exploring how to achieve single mixed use projects. This will require revisiting zoning schemes which allow for a range of various single use land uses to be assembled on adjacent stands (Greenberg, 2004). Such proactive planning measures are argued to be essential to facilitating mixed land use development (Parzen and Sigal, 2004; Greenberg, 2004). This often requires interdepartmental integration, another aspect listed as a major challenge to achieving TOD and will be discussed in more detail later.

### 2.3.1.3 Access and Circulation

Many authors have contributed to an understanding that the access and circulation environment impacts significantly on the functionality of a TOD area (Cervero, Murphy, Ferrell, et.al 2004). The ability for people to access the broader area surrounding a station and in turn access the station has proven to have dramatic impacts on ridership levels. In principle pedestrian movement should predominate over the private vehicle in practice this has been an area which is often contested and neglected (Zhang et al, 2012).

Some authors have used the node versus place debate to succinctly capture TOD circulation based issues (Belzer et al, 2004; Bertolini, 1996). Such debate deals largely with the circulation priority of TOD areas, as it grapples with the role and function of the public transport station within the context of the broader area. The node emphasis promotes the station role as core to the functioning of the transport network. This represents a focus on how the station can optimise transport operations, by ensuring the efficient transfer of people onto the public

transport system. The node emphasis often compromises the station's role (and broader surrounds) as a dynamic and vibrant public space or place. Where people meet, relax, trade and play (Belzer et al, 2004). Suzuki et al (2013) and Cervero and Dai (2014) highlight that this is the case with BRT median stations bounded by roadway, where the emphasis has been placed on ensuring the efficiency of bus movement to the expense of how the station contributes to the creation of vibrant public space.

The place based argument feeds directly into the pedestrian circulation prioritization for the broader TOD area. If a public transport station is a celebrated place and attracts people from the broader area to gather and interact then the public realm which provides access will be more encouraged to facilitate the comfortable and safe movement of people on foot. In areas where private vehicle access is predominant one often finds the station primarily functioning as a node, most focused on facilitating the ease of movement and access to inform modal transfer at the station. In lower density environments this often entails providing access and parking for private vehicles so as to capture a wider ridership for the system (Transport Research Board, 2002). The Gautrain system is perhaps a strong example of one which drives node based stations as opposed to place based stations with vehicle access and parking often prioritised (except for perhaps the Park and Pretoria Stations which display more place based dynamics, however important to note is that these stations preceded the automobile area<sup>14</sup> and the Gautrain anchored on to them as existing major rail stations).

According to Bertolini (1996) achieving a balance of the node and place functionality of stations is important for development of the broader surrounds. Belzer et al (2004) argue that there are very few defenders and promoters of the place based argument. This void of support, they further argue, is where the role of the local government must lobby to ensure that high quality public spaces are created around throughout station environments for TOD to be successful.

Experience of TOD projects highlights that parking is very rarely reduced as developers would not be willing to compromise on this aspect (Dittmar and Ohland, 2004, Zhang, et al, 2012). Linking to the points made around land use distribution reducing parking often makes TOD development unattractive to potential buyers and investors because the public transport system does not provide adequate access to services and amenities in a region (Zhang, et al, 2012). This arguably requires a fine balancing of parking requirements in association with TDM measures. However as Daisa (2004) points out, parking and traffic studies are limited for TODs and thus there is a lack of decision making frameworks to support TODs. The result is that traditional single use development traffic generating and parking understandings are drawn on to inform decision making for TOD developments. Daisa (2004) calls for more studies to be done investigating the actual trip rates generated in TODs. The provision of 'cheap' parking comes with major costs both in real terms and in economic externality terms (Shoup, 1997). The opportunity cost of developers providing parking is that they invest far less in the pedestrian access conditions which surround their development. It appears that in the node versus place debate that investment in the development of place is more often than not overlooked. It requires special attention to ensure that high quality pedestrian environments are provided to

<sup>14</sup> These stations existed as part of the national rail network which was developed before the rapid uptake of the private vehicle. They are also located in inner city environments made up of higher densities and mixes in land use. Thus the character of the urban environment cannot be attributed to the presence of the Gautrain system.

ensure that pedestrian circulation is prioritised. Transit stations which exhibit strong, high quality pedestrian links to the surrounding environment lead to far greater levels of transit ridership and civic vibrancy (Cervero, et al, 2004).

The major lesson is that developers will not take kindly to a significant reduction in parking levels, especially not in the short term. While in South Africa the majority of people do not own vehicles and could be accommodated in theory without parking provision, formal developments rarely seem to prioritize pedestrian access. The aspirational aspect of lifestyles cannot be overlooked in TOD development. A critical objective of socio-spatial transformation is to ensure greater social diversity and break down in the socio-economic divide. As such it might be important that wealthier car owning portions of the population are targeted as potential TOD occupants along with poorer transit dependant and emergent car owning portions of the population. Balancing parking supply versus providing vibrant and diverse, pedestrian-oriented public places is arguably one of the strategic ways to achieve broader policy objectives. The literature is clear that it will require greater emphasis and support on the idea of building station precincts into great vibrant places. Such an approach requires additional funds and greater urban management which also needs to be considered.

#### 2.3.1.4 Income Diversity

As mentioned earlier mixed income has not always featured prominently within global TOD principles. Increasingly however it is being included as an important aspect of driving inclusive urban growth. One might question why income features in the section on physical characteristics. It is included deliberately here as it is argued to have a direct impact on the physical nature of an area, through the range of housing types provided to accommodate an income diverse community. While this is more a design aspect, the focus of this section is on what international experience suggests about driving income diversity in TOD projects.

Belzer, et al (2007:8) provide a useful summary of the challenges faced in attempting to produce mixed income TOD when they state that

‘Currently, only high-end housing projects can afford to absorb the time, uncertainty and cost of risk inherent in TOD in the Denver region. The cost of land in and around existing and future transit stations is rising due to speculation, and land frequently is broken into small parcels, making it difficult for developers to find sites large enough to produce high-density housing at prices affordable to both the developer and the potential residents.’

The inclusion of affordable housing in TOD projects has grown in prominence since the introduction of the concept, often refer to as equitable TOD (Carlton and Fleissig, 2014; Pollock, Bluestone and Billingham, 2010; Poticha and Wood, 2009). There is growing support that a diversity of income groups provides a range of benefits in TOD projects. The vast majority of literature however points to the limited success in providing affordable housing in TOD projects as it generally makes the process more complex, more costly and less affordable for developers and ironically poorer residents (Carlton and Fleissig, 2014; Pollock, Bluestone and Billingham, 2010; Belzer et al, 2007; Poticha and Wood, 2009). As such the majority of the literature provides suggestions on how to overcome the vast challenges in an effort to realise mixed income TOD outcomes.

There are a number of issues which surround the inclusion of affordable housing in relation to TOD. According to Pollock, Bluestone and Billingham (2010) concerns around gentrification and displacement are prominent topics in development around public transport rich locations. They highlight that gentrification does not necessarily result in displacement. However, their study highlighted that where gentrification has occurred in the United States and displacement has not occurred, higher rentals mean that existing residents often cannot afford to continue living in such an area and move out- what is referred to as replacement (Pollock, Bluestone and Billingham, 2010). The issues of displacement and replacement are critically important to think through in the South African context. Especially where public transport system improvements are made in poorer marginalised areas of cities, should these transit improvements attract either public or private sector led development there is a real issue that existing residents who are transit users will be displaced or replaced. Another concern for transit operators is that often such gentrification processes attract wealthier 'neighbours' who continue to use private vehicles regardless of their transit rich location (Pollock, Bluestone and Billingham, 2010: 4).

'Whether by displacement or replacement, or a combination of the two, in some transit-rich neighborhoods the pattern of change is working against the goal of attracting transit oriented neighbors: the most likely potential transit riders are being crowded out by car owners less likely to be regular users of transit.'

Such observation in the US raises a critical point regarding TOD in South Africa, will the pursuit of TOD result in the displacement of existing public transport users, who are largely poorer and previously marginalised members of society? However, by focusing on the link between diversity and transit ridership Pollock et al (2010) arguably neglect the important social cohesion benefits associated with diverse neighbourhoods and communities. This is argued to be a critical objective of transformation in the South African context (City of Johannesburg, 2014).

In this replacement and displacement discussion perhaps the work of Marks and Wilkinson (2007) on the role of the gap housing market analysis as a key opportunity is important to consider. Where it is argued that this income bracket is where there is the highest level of movement out of public transport modes to private cars. Providing gap housing market opportunities along public transport corridors is potentially a strategic way to ensure existing public transport users are not shifting to private transport modes. This will be discussed in more detail later in the report.

What is clear from the literature is that driving income diversity in TOD has proved exceptionally challenging. In South Africa where the socio-spatial restructuring of cities towards a more equitable and efficient accessibility is a core objective, such an analysis poses major questions around the extent to which TOD can be (at least initially) a driver of inclusive development at the required scale.

The section above has highlighted how there are no straightforward guidelines to achieve the principles outlined in TOD. This is partially because there are no clear cut standards and guidelines which inform exact outcomes in these areas. The overarching message is that making progress towards a TOD agenda will require a level of experimentation, further research and implementation efforts which move beyond the current parameters of development.

While this section has perhaps highlighted the challenges which surround the details of the suggested principles and some of the challenges which act as barriers to achieving outcomes it has not provided any major details of where success has been achieved and what that looks like. What is clear from the literature dealing with the physical principles of TOD is that detailed understandings of the physical characteristics depend significantly on local station area context. Contextual realities have become central to informing a differentiated set of detailed TOD physical characteristics. Each station context is required to be analysed in detail before arriving at a set of detailed physical characteristics which will reflect the broader set of TOD principles.

This analysis prompts a key question, in all of this uncertainty and the many challenges faced, what have been the particular factors which have enabled effective outcomes? An overview of the challenges indicates that achieving such physical characteristics is more costly and takes more time than 'regular' mono-functional lower density development. Reducing parking and promoting the development of quality pedestrian environments requires extraordinary effort outside of usual standards and procedures and often these issues have low levels of support. In bringing all of these aspects together the stakeholder complexity becomes evident as a factor which compounds the challenge.

It is perhaps no surprise then that where success has been achieved it has required extraordinary effort from all involved in the development process. The next section discusses the importance of grappling with the 'softer' aspects of TOD implementation.

### 2.3.2 LAND DEVELOPMENT DYNAMICS

Factors beyond the physical challenges associated with TOD have been documented to have major impacts on the extent to which outcomes can be achieved. Documented reflections in all contexts highlight that political, institutional, financial and stakeholder issues are more often than not the major barriers or enablers to effective TOD implementation (Hook et al, 2013; Dittmar and Ohland, 2004; Sussman and Gilat, 2002; Suzuki et al, 2013; Charles and Hale, 2006; Huang and Mehndiratta, 2014; Renne and Wells, 2002; Curtis et al, 2009). These will be referred to as the 'land development dynamics' in this research. These issues often serve as the defining aspects of TOD projects but are never included as defining elements in TOD descriptions. Almost as if these were the 'terms and conditions' of advancing a TOD agenda which are not immediately clear at a conceptual level.

Sussman and Gilat (2002) as well as Suzuki et al (2013) on their analysis of TOD application in the developing world highlight that these issues are perhaps even more crippling in developing world contexts and thus arguably demand even greater attention when thinking through applying TOD principals in a South African context. This section will outline the key insights and lessons emerging from international experience in this regard. Firstly, by outlining why each of the issues identified is considered to be essential to achieving results and then highlighting how these issues have been approached in cases where TOD successes are evident.

#### 2.3.2.1 Institutional

Institutional issues cover a range of different factors and intersect closely with political systems, human and financial capacity. Many authors indicate that institutional issues present some of the largest challenges to TOD in the developed and developing world (Suzuki et al, 2013;



Sussman and Gilat, 2002, Dittmar and Ohland, 2004, Charles and Hale, 2006). Charles and Hale (2006: 2) highlight the importance of institutional issues when they state:

‘Recognising a successful TOD product is relatively straight-forward. The question now for modern planners becomes one of organising and co-ordinating stakeholders and institutions to deliver these favoured outcomes through a coherent and workable process’.

Much literature highlights that for TOD efforts to be effective a focused long term plan and vision for what is to be achieved is essential (Suzuki, 2013; Dittmar and Ohland). This is a major issue in South Africa where planning alignment across the various government departments and spheres is repeatedly reported as a major obstacle to achieving integrated development (COGTA, 2013). This will be elaborated on later in this section under the multiple stakeholder heading.

Sussman and Gilat (2002) point to the weakness of planning departments in developing cities who often have less resources, are ill equipped to collect data to inform the planning process and are unable to effectively enforce zoning codes. Reflecting on the extent to which local government planning departments in South Africa are able to plan and facilitate the requirements for TOD is important. In contexts where there are so many urban issues which city governments have to deal with, driving a TOD growth agenda in all its complexity would require developing and availing the adequate resources for the stakeholders responsible for driving TOD.

Dittmar and Ohland (2004) highlight that one of the critical success factors in achieving effective TODs and overcoming the challenges presented above has been the establishment of dedicated departments, institutional arrangements and staff tasked with driving TOD. In certain cases such units were capacitated with people from various professional backgrounds which impact on TOD. These sometimes include including skills which are not often associated with municipal planning or transit operation. In others it required high levels of engagement and co-ordination. Perhaps clearly described in the Cleveland example whereby Hook et al (2013: 8) explain that ‘The City made a concerted effort to channel new development to the Health Line. It found the right institutional partners — including strong community development corporations, private foundations and municipal agencies — which in turn accessed a wide variety of financing options, assembled land, and worked closely with developers’. This point speaks closely to the issue of the multiple stakeholder nature of TOD. However it provides important insight into the type of institutional arrangements which are required to drive effective TOD. The projects which were underpinned by a specialised institutional arrangement and provided with real decision making power have demonstrated that they provide the most effective outcomes (Dittmar and Ohland, 2004; Hook et al, 2013). It will be critical to assess the extent to which such institutional architecture and decision making issues are being reflected in the approach to TOD in South Africa.

The institutional architecture is thus an important enabling aspect of delivering TOD projects. Which department(s) becomes responsible? How are channels created for different departments and stakeholders to collaborate? To what outcomes are they collectively and individually held to account? These are important aspects which the international literature indicates that there is in fact no one size fits all approach. Ensuring effective enabling

institutional environments requires the application of thought on how best to harness the existing sources of finances, generating the political will to make tough strategic decisions and opening up spaces for meaningful stakeholder engagement and participation. Thinking through these institutional reforms has been critical to the success of TOD implementation in other contexts (Suzuki et al, 2013; Dittmar and Ohland, 2004; Hook et al, 2013; Curtis, et al 2009). Literature illustrates that there are many ways in which reforms can occur to strengthen the ability to achieve TOD, highlighted by Suzuki et al (2013: 7) when they explain:

‘The Washington Metropolitan Area Transit Authority (WMATA)—was formed and given the resources needed to leverage TOD. Particularly important was the formation of a proactive real estate development department within the organization, staffed by individuals with private sector experience to create a more entrepreneurial approach to land development. Creating a town planning and urban design department to ensure that joint development projects are of high quality and architecturally integrated is another key institutional reform, as demonstrated by the case of Hong Kong SAR, China.’

There are a variety of other examples similarly highlighting the importance of assembling particular institutional arrangements to drive the co-ordinated outcomes across a range of different disciplines (see Dittmar and Ohland, 2004 and Curtis, et al, 2009). Some of the most prominently reported land use transport case studies from the developing world have resulted from powerful, visionary mayors who have been able to make bold decisions and generate outcomes relatively rapidly (Suzuki et al, 2013). While replication of this approach arguably presents challenges associated with the reliance on individuals, threats of non-democratic vision and decision making processes and potential breakdown in continuity when replaced, it has been a prominent feature of some developing world good practice and will be discussed later in the report.

TOD in Cleveland has been reported as a good practice by the ITDP (Hook et al, 2013). It is clear that institutional issues were a strong focus of the success. In this case the responsibility for co-ordinating development lay within the economic development department which was provided with mayoral priority over other sector departments to ensure co-ordinated decision making. This aspect will be discussed in the following section in more detail. What is interesting from an institutional perspective in this case is that TOD was seen as an economic development function not a specific role of planning or the transit agency. It arguably illustrates the importance in thinking through the broader developmental objectives which TOD could achieve and such thinking is arguably useful in a South African context where TOD objectives might go beyond reducing vehicle use.

The key lesson provided by the literature is that there is no single approach to institutional arrangements which enable TOD outcomes, but rather that it requires careful consideration of the current institutional context, resources, capacities and skills available. What is clear however, is that in contexts where mono-functional land development is the mainstream practice without significant reform to the manner in which land development processes and decision making is carried out there is limited evidence to suggest that effective TOD outcomes can be achieved.

### 2.3.2.2 Political

Political issues are arguably closely linked to the institutional arrangements established for TOD implementation and serve as a critical informant to the array of issues discussed throughout this report. The case study in the City of Cleveland highlights that often the success of an institutional arrangement is dependent on the level of political support offered. In Cleveland the Department of Economic Development for the City was tasked with driving TOD along selected corridors. However it did require immense coordination from various municipal departments (Hook et al 2013:65),

'In Cleveland, many city agencies worked closely together to ensure that land-use decisions complemented decisions about the Health Line BRT. While the Greater Cleveland Transit Authority planned and operates the BRT, the city planning department and the public works, community development, and economic development departments were all involved to emphasize the connection between the Health Line and land use. The Department of City Planning was responsible for zoning changes and planning, while the Department of Economic Development designed and implemented the developer outreach strategy once the Health Line was operational. The Department of Public Works participated in the corridor beautification process, transforming segments of the corridor with decorative street furniture and greenery. Finally, the Department of Community Development made funds for station-area planning available to local community development corporations'

This is a dramatically different understanding of the current role which economic development departments play in South African cities which are more focused around Local Economic Development (LED) activities<sup>15</sup>. In a presentation in Johannesburg<sup>16</sup> on TOD in Cleveland the department head Tracey Nichols indicated that one of the most instrumental factors in being able to achieve TOD was that she had a direct line to the mayor to overcome any issues arising from any inter departmental issues. Essentially the decision making of the economic development department was politically prioritized and all other departments had to ensure that efforts supported the implementation of TOD. Perhaps captured by Hook et al (2013: 8) when referring to the Cleveland case and stating that it required 'Strong political backing and a high-quality BRT, supplemented by public parks, landscaping, fibre optic cables, and other modern amenities, all came together to begin to revitalize Cleveland'. This is a good example of the type of political prioritisation that is required to overcome conflicting or ill aligned interests existing across various municipal departments. It is for this reason that Hook, et al (2013) argue that the most important criteria in achieving effective TOD is the level of government support (interpreted in this report as the level of political support).

This is alarming given that Suzuki et al (2013) have identified that the short term political focus in developing world countries is a major obstacle to achieving TOD. Where mayors are often more concerned about focusing on issues which can provide the best possible short term results, TODs long time frames are often unattractive focus areas. According to Suzuki et al (2013) this leads to the focus on the rapid development of public transport systems rather than working to integrated urban development. This lack of focused continuity is a major challenge in South African cities where mayoral terms are on five year cycles and often leadership

<sup>15</sup> The South African Cities Network (2011) State of Cities Report is critical of the conceptualisation of local economic development which has been the economic development focus of cities as argues for a fundamental rethink in the role that Cities in south Africa play in driving economic development.

<sup>16</sup> The ITDP were invited to present the publication on the TOD standard- Tracey Nicols accompanied the ITDP team and gave a presentation as the Cleveland BRT Health Line TOD featured in the report.

attrition rates are high. More recently there does seem to be improved continuity in cities where mayors have served two or more terms. In Johannesburg for example there has been a clear commitment to the longer term urban integration along selected corridors. However this does not necessarily negate the need to display short term results and perhaps the continued BRT expansion without indication of supportive land development reflect Suzuki, et al (2013) views.

As briefly mentioned previously the good practice examples of land use transport integration in the developing world highlight that 'visions need visionaries' (Suzuki et al, 2013: 168). Such visionary leadership is required to develop local culture which believes in the development of more sustainable, equitable growth in cities. This is argued to be important in cultivating likeminded political successors so as to achieve greater continuity (Suzuki et al, 2013). Furthermore Suzuki et al (2013) argue that political competition among municipalities is often a leading cause of a lack of co-ordinated planning and investment across municipal boundaries. This is perhaps a concern in Gauteng where three metropolitan municipalities form the core of a single functional region.

Political traction for plans and long term visions is important (Suzuki et al, 2013). As such plans need to be marketed to a broader public audience and city building stakeholders as the acceptance of the plan is the ultimate determinant of the effectiveness.

The Corridors of Freedom vision and plan provided by the City of Johannesburg is arguably an attempt to achieve engagement with wider audiences. However, the plan is not city wide, and one can argue that it has struggled to generate broader public awareness and support. In contrast the five finger plan of Copenhagen was a plan which covered the entire city and generated much interest and support (Cervero, 1998; Suzuki et al, 2013). Hook et al (2013) seem to suggest that while the plan itself does not necessarily have to be city wide, the implications of the plan should be. These implications need to be communicated effectively and the city wide benefits need to be marketed and engaged upon. This is of course made difficult by the multiple and often contradictory plans produced by different spheres of government in South Africa<sup>17</sup>.

The ability of political leaders to articulate clearly the trade-offs and rationale for decisions has proved to be a critical element for the implementation of effective land use- public transport integration (Hrelja, 2015). Communicating effectively to a range of different stakeholders with different levels of power to influence investment decisions is important. International experience highlights that where politicians have been bold and clear on why they have made decisions which benefit public transport users the outcomes have proved to have benefits beyond the users. The examples of Bogota and Medellin in Columbia and Curitiba in Brazil are regularly touted as exemplary in this regard. What is most prominent in these examples is the constant presence of prominent, passionate and bold political leaders who have championed major public transport transformation efforts and led the reconfiguration of city development processes oriented towards public transport (Suzuki et al, 2013; Andrews and Fajardo, 2014; Mang, 2015)

<sup>17</sup> The current human settlement masterplan for megaprojects and the GTP 2055 are good examples of this. However the enactment and implementation of SPLUMA might overcome the challenges of multiple spheres of government planning and taking decisions in municipal areas.

It does seem that the political dimension in TOD is not as widely researched and commented on but some prominent commentators have increasingly begun to point towards this dimension as a critical enabler of TOD outcomes. It seems a particular issue in developing world contexts which needs to be engaged when driving a TOD agenda. At the heart of the political issue is decision making. It is clear from this review that decisions around TOD are often challenging to make as they are often done (at least in the initial stages) with some uncertainty (as highlighted by the physical characteristics section) and also often outside of existing decision making frameworks. Shifting the manner in which development happens and potentially altering the status quo of winners and losers can be a challenge for politicians who rely on support from communities for their elected position of office. It seems that the literature is highlighting that political support is required at a range of different levels. Driving TOD requires the provision of real decision making power and ability to implement by those responsible and political prioritisation seems critical in this regard. Also important is the manner in which implications of visions, plans and decisions made on communities are communicated. Trade-offs will need to be made to accommodate a different set of outcomes, if this process is not championed and support built along the way then there is arguably a risk that constituencies can become exceptionally disgruntled with outcomes which are deviating from expectations. There is also the need to drive political integration and collaboration with other spheres of government and private and community stakeholders. This is critical to ensure that multiple actor based TOD projects are adequately resourced and supported to ensure that outcomes are achieved. The ability to support long term plans has also been noted as critical to TOD success.

### 2.3.2.3 Financial

There are a range of general financing issues surrounding TODs, many of these have been discussed in previous sections. These include challenges in accessing and structuring finance due to perceived complexity and risk associated with TOD (Pollack and Prater, 2013). There are also the broader financial resource challenges which are more severe in the developing world and where there are a range of pressing issues which demand attention (Sussman and Gilat, 2002 and Suzuki et al, 2013). Reading these issues together highlight points made previously regarding the major importance of strong political support for channelling funding towards 'expensive' projects with often uncertain outcomes. This section will outline some of these challenges in more detail from previous experience in both developed and developing world contexts.

According to Sussman and Gilat (2002) the high cost of infrastructure to support TOD is a major obstacle. They refer to transit alone, but this arguably encompasses the investment in water, drainage, sewage and electricity as well. All carry significant costs and require shifting potential investment in other areas to support public transport corridors. The emphasis is on the strategic allocation of funding. Given the limited ability of TOD to accommodate poorer people to date, this poses major questions around where the state is prioritising investment in South Africa. In this regard it seems important that finance for affordable accommodation be made available within a TOD agenda.

The emerging story around financing TOD indicates that it requires a range of financing mechanisms. In particular where TOD is not yet considered a mainstream approach, the early development efforts require financing to be pulled from multiple sources and arrangements to provide demonstration in the market that such projects are viable (Parzen and Sigal, 2004;



argument that suggests as TOD showcases success so the financial systems (and others) will adapt to more effectively enable such development to be developed at scale. The challenge for TOD implementers is to assemble finances in the early stages of TOD and ensure that projects can be seen to their conclusion in order to showcase the benefits. Where TOD efforts have been completed in America there is much energy around documenting the outcomes and showcasing the impacts. This research is critically important to the financial industry. Comparing various commentaries on TOD outcomes in America highlights that it is important to focus on the details and ensure that none of the principles are compromised. When this happens many commentators have argued that what is achieved is development in close proximity to public transport stations, often with no improvement in the public realm and little reduction in parking provision. Such developments are termed Transit Adjacent Development (TAD) and do little to showcase the benefits of TOD (Dittmar and Ohland, 2004 and Renne and Wells, 2002). Arguably this opens up the opportunity for critics to suggest that TOD does not work. Finance is an important consideration when discussing the details of outcomes as there are often financial arguments raised as to why parking cannot be reduced or that improvements in the public realm ensure a project is too expensive and are considered to be 'nice to haves' being cut from the project should the finances run out. This links to the political priority of spending in projects and where the emphasis lies in TOD. The research is clear that pedestrian environment and access and circulation priority improvements are essential to TOD success.

Finance for TOD is particularly challenging to obtain given the existing mainstream funding systems for property development. Even more so when financial resources are limited as is the case in many developing world countries. However, by innovatively drawing on a number of financial mechanisms TOD pioneers have demonstrated that financing such projects is possible. Hopefully successful TOD demonstration projects will showcase the feasibility and make finance for such projects more readily available. It does seem that finance poses a challenge to TOD but the literature provides the sense that this obstacle can be overcome and increasingly funds and finance are being made available for TOD.

#### 2.3.2.4 Multi-stakeholder

The idea that effective TOD implementation relies on a range of actors to work together is one of the most prominent aspects in the literature. This multiple-stakeholder nature is also cited as one of the greatest challenges to work through when attempting to implement TOD (Belzer et al, 2004; Greenberg, 2004; Charles and Hale, 2006; Edghill, Kroen and Schuerer, 2009; Hook et al, 2013, Cervero, 1998). I argue that this is a core overarching issue which is embedded in each of the issues discussed previously. TOD takes place at the intersection of transport and the creation of urban communities, but also increasingly informing urban policy and political choices and ultimately means that the stakeholder dynamics are complex. According to Edghill, Kroen and Schuerer (2009:149) local governments are central to facilitating the multiple dimensions of TOD, stating that they 'have a critical role in facilitating the sequencing of framing these elements and blending them into viable policies and plans jointly with communities, the private sector and decision makers at all levels'. Creating platforms for stakeholders to come together and work towards a common vision is central to the success of a TOD growth agenda (Suzuki et al, 2013; Dittmar and Ohland, 2004). Suzuki et al (2013:14) argue that 'cities need to translate their visions of the future into the land-use and infrastructure elements of a statutory master plan, which must be market sensitive, socially inclusive, and rooted in fiscal realities'. According to Renne and Wells (2002) this requires collaboration amongst the range of

stakeholders who are experienced in each of these areas, 'In order to overcome obstacles, collaboration is essential. Banks, local governments, transit agencies, and developers must all work in a flexible manner to build a successful TOD'. However, building such a collaborative platform is often more difficult than the rhetoric suggests.

Belzer et al (2004), Greenberg (2004) and Charles and Hale (2006) indicate that various stakeholders often have competing and contradictory interests which will need to be balanced and negotiated. Belzer et al (2004) presents the range of stakeholders to be considered in TOD projects. They include local government, transit agencies, federal (national) government, developers/ financiers and the community. However, literature and the stakeholder analysis conducted as part of this research highlights that each of these stakeholders can be unpacked into many more stakeholders often with their own competing and contradictory interests. It is thus problematic to assume that local government or the transit operator have homogenous interests (at least this has been evident to a certain extent in the South African context). Often different sector departments in municipalities have individual agendas which do not align neatly to working towards the same outcome and sometimes are contradictory.

Acknowledging the significance of this issue there have been attempts internationally to develop models which bring together the range of stakeholder interests to showcase the consequences of merging various interests. Duffhues et al (2014) highlight that the institutions and jurisdictions associated with a corridor development are wide ranging and complex. The many actors required to co-ordinate efforts to deliver the TOD projects make such a task difficult. Often the outcomes are reflective of political compromises which lead to ineffective TOD developments.

In this regard dialogue led through visioning has been an innovative way in which to engage a range of different stakeholders (Braughton et al, 2011). Such an approach has been used effectively to stimulate interest and debate between stakeholders with competing interests. One of the largest value propositions of TOD is that it has the ability to provide benefits for all stakeholders. The literature highlights that it is important for various stakeholders to have a clearer understanding what TOD might mean and visioning techniques are one proposed way.

Transport systems by their very nature traverse a wide variety of contexts. This variety of contexts has been understood to be an informant of providing nuanced approaches to TOD from its original conception (Dittmar and Ohland, 2004, Carlton, 2004, Suzuki et al 2013) but also exacerbates the complexity of stakeholders engaging with TOD at a regional level. Each station precinct will bring with it a variety of stakeholders and issues. The stakeholder complexity and the idea that it varies in nature along different parts of a public transport route exacerbate the challenge of implementing localised TOD solutions at the site level.

The South African context arguably presents many of these challenges. For example certain stations might be multi-modal interchanges which draw the interests of various transit operators with sometimes conflicting interests and objectives. Other stations might be located in existing residential areas where small land lots are owned by many individuals. The transit agency will seek to intensify development on the land surrounding the station to increase ridership, the local government might seek to foster the development of affordable housing in new developments and existing communities might resist change to protect the current qualities of the neighbourhood.

These are all real challenges, the majority of which a municipal vision or spatial planning alone cannot address. Providing a platform for stakeholders identified to engage collaboratively and develop a negotiated way forward seems an important component of advancing TOD. Many authors (Edghill, Kroen and Schuerer, 2009, Renne and Wells, 2002, Belzer, et al, 2004, Hook et al, 2013) argue that the local government is best placed to drive such an effort. It is argued that providing a discursive, negotiated approach to planning and implementing TOD will assist in overcoming many of the challenges which impede the realisation of physical urban design principles of TOD. Developers and communities have a particular understanding of densities and appropriate land uses. Various transit operators have a stance on parking provision. Bringing these interests and understandings together and negotiating acceptable and implementable outcomes seems a logical way forward. Furthermore, it will also provide clear benefits in thinking through the type of institutional arrangements required to deliver effective TOD results and at the same time will assist in clarifying many of the financial issues and options available and furthermore, might even enable greater levels of finances to be harnessed.

Over the past half century planning theory has been developed which supports more discursive and collaborate efforts between the broader community and planning authorities, Healey (1993) refers to this as 'The communicative turn in planning theory'. Participatory planning has emerged as a prominent concept in the urban planning profession. Arnstein (1969) through the use of the participation ladder highlights however that there are varying degrees of participation in planning processes. These range from manipulation to citizen control. Many authors have been highly critical of the manner in which participation is carried out, arguing that participation tends to occur more towards the manipulation end of the scale (Cornwell, 2008; Willson, 2001 and Arnstein, 1969). This is largely due to the added complexity of including meaningful participation in projects which are under pressure from a time and budget perspective. Without delving into participatory planning theory debates, the point is that TOD by its very nature seems to be a concept which in order to be effectively implemented needs to be planned and implemented in partnership with a range of stakeholders. It brings together many aspects of urban development which are difficult to achieve in their own right and whereby it is unlikely that a single actor will have significant understanding of all the aspects to be able to drive implementation.

Where role players have aligned their policies and goals and committed to sustained long term efforts the outcomes have been encouraging (Hook et al, 2013, Belzer et al, 2004, Suzuki et al, 2013; Cervero, 1998). It is somewhat clear that TOD will require extraordinary institutional arrangements, collaboration and financing efforts, all of which rely on the range of actors to come together. This all requires focused political support as choosing to invest in projects which generally cost more and take longer is not attractive when short term cycles are important. It is the long term benefits of such efforts which hold the greatest value. The form that such partnership and collaboration has taken in different cities has varied. In certain instances existing institutional arrangements were used but mandates and powers were altered, in others all stakeholders were brought together in the beginning of the process to ensure alignment from project conceptualisation. In some instances new units have been established in city governments and equipped with the range of skill sets required to think through TOD issues and connect to broader development communities (Dittmar and Ohland, 2004).

Developing some sort of clear framework which brings all of these stakeholder views into the decision making process around TOD is critically important. It is argued that this area is perhaps the most strategic to focus on as it is through the multiple actors working together that common vision can be formulated, innovation in financing can be developed and energy harnessed to carry out challenging and complex development projects. Some might argue that all development projects face similar challenges and could make similar arguments for such a co-ordinated approach. However, the majority of literature documenting challenges raises the range and diversity of stakeholders associated with TOD projects and their often competing interests as a major challenge to advancing effective TOD. Belzer et al (2004: 45) situate this well when they state that 'without a clear functional definition of TOD- from which a coherent set of goals can be derived- there is no framework for weighting trade-offs and making choices about how to balance competing goals. Although competing goals can be a problem in any large project, the nature of TOD and the number of actors involved make the challenge even more significant'.

It does seem that this area is also connected to each of the other aspects mentioned throughout the review, be it technical understandings or 'softer' institutional issues. Bringing stakeholders together as opposed to working in spite of each other will allow for a process of working through contested and uncertain issues. Experience highlights that such an approach yields better TOD outcomes in the long term.

### 2.3.3 AN OVERVIEW OF THE LITERATURE ON LESSONS AND EXPERIENCE

This analysis has highlighted that TOD was developed as a concept which could combat the negative consequences which private vehicle dominance was having in North American cities. So while many of the principles align strongly to South African policy objectives, it is clear that TOD conceptualisation will require some adapted thinking to deal with the specific contextual issues faced in South Africa. The issue of affordability and income diversity is a clear area of adaption but there are possible others which will need to be worked through. However, I argue that the detailed outcomes of TOD efforts are critical to understanding the implications of adopting or adapting the physical principles. The review lends itself to a more detailed understanding of 'internationally accepted principles of TOD' than a mere listing of the physical characteristics. What it perhaps highlights is that the detail underpinning the physical principles is far less clear and 'internationally accepted' than is perhaps suggested in the NDP. This is an important point to acknowledge in advancing TOD thinking and application and it will be essential to assess the extent to which some of these lessons are being picked up in the South African thinking around TOD.

This section has highlighted that the barriers to achieving TOD are significant. However, despite these challenges there are instances and examples where TOD efforts are yielding effective outcomes. In this regard it seems that the 'softer' dynamics surrounding land development are the critical enablers for advancing a TOD agenda. TOD continues to be the exception, requiring special arrangements and extra-ordinary efforts. An idea which is not prominent within the literature (although there is some limited acknowledgement by Dittmar and Ohland, 2004) is the identified intent to shift general development practices to TOD by drawing on the special arrangements and learnings to incrementally shift normalised practices toward more TOD based practices. It does seem that such a shift is critical to the long term success of TOD (and

arguably broader sustainable city building) and Dittmar and Ohland (2004) make this point clearly.

However, in this context it appears that for TOD efforts to be successful they will require the collaboration of stakeholders to work outside the realms of current developmental practice, forming institutional arrangements which allow for a multitude of ideas, bold and focused political support and innovations in finances which can drive TOD outcomes. It is clear from the international literature that where this has been understood and energy has been directed to these areas that the most effective outcomes have been achieved. Such collaborative efforts also allow for stakeholders to determine what the most appropriate manifestation of TOD principles for their specific context would be, which creates a rich array of examples to learn from identifying what works well and how it was achieved.

There are some important overarching issues which are important to note as well. Scale seems to be a critical element which impacts all the issues discussed above. There is perhaps also an important distinction to be made between individual TOD projects and wider TOD area or regional plans. The review to date has discussed these generally without making the necessary distinction as it is based on the physical characteristics and the enabling aspects. The literature indicates that there has been reflection on both TOD planning as well as TOD projects. Furthermore it is clear that strong planning is one of the key criteria informing effective implementation. However, I argue that planning is underpinned by the land development dynamics discussed above.

Arguably linked to scale another critical issue is the emphasis on understanding the various contexts of stations throughout the region or transit system. It is clear that the contexts will inform both the type and potential feasibility of physical characteristics but also the nature of the more enabling factors of TOD. Belzer and Autler (2002: 27) posit a major concern regarding the development of TOD in poorer areas when they discuss the importance of context,

'Even with transit, however, any given site must still compete with every other site in the region for development. Since transit is only one of many factors driving development, many other sites may prove more attractive to developers. To be sure, the public sector – most notably local government – can elevate market demand at a site by working to create more of the necessary conditions for development. But without strong existing demand or coordinated policies to help create it, transit alone will not drive appropriate development even if it leads to increases in land costs.

This can make transit-oriented development a particular challenge in low-income areas, where the real estate market is usually weak. Real or perceived problems such as crime, social problems, and deteriorated physical conditions deter investment. Either investment will simply not occur or the quality of the development will be compromised. As a result, new development in transit-rich low-income neighborhoods is very difficult to achieve and often lacks the full set of features, such as appropriate site design and pedestrian connectivity that would maximize location efficiency. Under these conditions well-planned transit investments can constitute a key piece of an economic development or revitalization package, but a host of supporting policies, incentives, and investments are also necessary.'

This prominent focus on context has informed the next section of this chapter. While this section has also arguably highlighted that it is clear that there are many valuable lessons on

offer from international TOD implementation experience the review of TOD specific literature has led me to question the extent to which the concept has been thought about relative to the specific socio-economic contexts found across the developing world. It is interesting to note that the reported role and nature of TOD does not seem to vary significantly in developed and developing world contexts. Meaning that most reports in both contexts seek to target reduced vehicle travel and focus only on formal development responses.

Acknowledging that the developing world does not share a homogenous contextual reality is critical but I cannot get a sense of a deep reflection of the socio-economic challenges faced by many developing cities when TOD thinking is applied in these contexts.

To date it appears that most of the writing has emerged from Central and South American and Asian cities, indicating that there are clear learnings of the potential that TOD has to offer sustainable growth aspiration. However the literature has not yet assisted with understanding how to deal with the likes of the dualistic context identified by Wilkinson (2006). It is acknowledged that there is a clear call by prominent commentators (Dittmar and Ohland, 2004; Suzuki et al, 2013) to think about station context and apply different types of TOD development. Perhaps appropriately highlighted by Suzuki et al (2013: 36) when they state that,

‘TOD concepts should be carefully adapted to reflect the local urban context, social and cultural considerations, and market realities. A one-size-fits-all approach to TOD planning and design is not recommended, particularly for rapidly growing cities in developing countries. Instead, cities should develop typologies of transit station environments and TODs that correspond to local conditions.’

Such insight arguably assists in a principled way to think through the contextual realities in South African cities but when one assesses the various TOD types presented they do not seem to assist when thinking of how to deal with poverty and informality. The next section of this chapter engages with international writings dealing particularly with TOD in the developing world context and specifically seeks to gain insight around how to approach the dualistic nature of South African cities.

## 2.4 THE DIFFUSION OF TOD CONCEPTS INTO THE DEVELOPING WORLD

The growth of urban areas in the developing world is projected to rapidly increase over the next half century. According to the United Nations (2014) ‘Projections show that urbanization combined with the overall growth of the world’s population could add another 2.5 billion people to urban populations by 2050, with close to 90 percent of the increase concentrated in Asia and Africa’. The need to think about urban growth in the research is to contemplate the opportunity which exists to accommodate such new growth. The challenge faced in the developed world is largely one of retrofitting, in that urbanization levels are fairly high and they are now forced to think about how to reconfigure their urban environments to ensure more sustainable transport-land use relationships. While the retrofitting argument still holds relevance in developing world contexts where urban growth has already led to spatial outcomes, United Nations’ (UN) projections suggest there is significant growth to come. The opportunity lies in pro-actively managing and accommodating growth in a far more sustainable manner. The preceding challenge however is that according to many the majority of urban growth in the developing world is projected to be associated with poverty and informality (Freire, Lall and Leipziger, 2014; Pieterse, 2011; Roy, 2005, Lombard, 2014; UN-Habitat, 2010). The UCT research report

13-14 (UCT, 2013) estimates that the middle-class population of South Africa is expected to double by 2050 and the population of informal dwellers to treble. According to UCT (2013: 100):

Urban population growth in Africa is taking place at such a rate that – if there is not an adequate understanding of the situation, and if solutions are not developed quickly – the continent is heading towards a crisis of poverty, inequality and lack of resources for its city people.

Only three percent of urban dwellers are eligible for a mortgage and only 28% have stable jobs (including minimum wage employees) (UCT, 2013). This rapid growth of informality is what Pieterse (2011) refers to as ‘informal urbanism’ and research suggests will become an ever growing reality in South African cities. While research indicates that it is the smaller secondary cities across Africa where most growth will concentrate most informal growth is occurring within South African large urban centres (South African Cities Network, 2011). This arguably highlights the dualistic nature of South African cities which Wilkinson (2006) identified as important to consider in TOD approaches, but signs are that the dualistic nature of South African cities will be exacerbated. How does TOD, which is attempting to achieve socio-spatial transformation, deal with inevitable and ever growing poverty and informality?

The literature review completed thus far highlights that there is limited TOD explicit literature available specifically in developing world contexts. Of that limited literature the majority is based in Asia and South and Central America. It has indicated that there are strong proponents for TOD growth as a strategic development option. The reading of the literature however indicates that TOD is being conceptualised in the developing world largely as a way to curb the rapidly rising uptake of private vehicle travel (Sussman and Gilat, 2002, Suzuki et al, 2013 and Delhi Development Authority, 2012). It is argued in the literature that it holds much opportunity to prevent the widespread uptake of the private vehicle and in many ways avoid the urban growth path experienced by North American cities. The outlook raises a potential question regarding the traditional approach to TOD applied in North America, its limited outcomes, and its potential impact in contexts where poverty and informality are prevalent. While it might hold certain applicability in areas where private and public investment is spent in formal development channels, in the face of the urbanisation context presented one might argue that engaging with the poverty and informality of growth will be an important aspect of managing urban growth. This notion perhaps moves beyond the more conventional understanding of TOD but the strong emphasis placed on context specific TOD solutions by prominent commentators perhaps presents an opportunity to think about TOD in a more nuanced manner.

There are some emergent experiences in developing world contexts where investment in and around public transport systems has less to do with curbing the uptake of the private vehicle per se and more with improving the experience of the already public transport dependant. Such investment is grappling less with parking and reduced vehicle kilometres travelled and more with enhancing public space and surrounding facilities for existing public transport users. Increasingly this social capital emphasis with strong links to transit infrastructure is being

reported as a form of TOD<sup>22</sup>. This represents a potentially different TOD investment approach. The more formal (often touted) developing world TOD responses as well as this emerging and differentiated approach will be discussed in this section.

#### 2.4.1 MAINSTREAM TOD APPROACHES IN THE DEVELOPING WORLD

Sussman and Gilat (2002) indicated the dearth of research on TOD in developing world contexts some thirteen years ago. Since then there is more research and literature emerging on TOD in developing world contexts. Most of which argues that TOD perhaps holds greater promise in developing world contexts where automobile ownership is lower than in developed world contexts. Advocating for system wide TOD implementation, which is the idea that TOD is applied across an entire public transport system ensuring that destinations and origins available are maximised, Sussman and Gilat (2002) introduce the examples of Curitiba and Tokyo. However, they do not discuss the particular political systems which allowed for the successful implementation of system wide TOD implementation. These enabling factors are critically important to understand when assessing TOD outcomes. There is a counter view to the system wide implementation approach offered by Suzuki et al (2013: 190) arguing that it is best to select a handful of stations along a corridor or system in order to focus efforts for effective and demonstrative outcomes.

'Experiences from Copenhagen and Stockholm reveal that a cogent regional vision helps ensure that high-capacity transit investments produce desired urban-form outcomes. Experiences from these and other cities suggest that station-area planning needs to be carried out selectively and judiciously. In many settings, planning efforts should be devoted to developing or redeveloping no more than a handful of rail and BRT stations, in order to concentrate resources and increase the odds of a "win-win" arrangement in which both public and private interests share the benefits conferred by new rail investments. Demonstrating that positive land-use changes are possible in conjunction with a rail investment is important to produce models the larger development community can emulate as well as to convince banks and lenders that investing in station-area projects can be financially remunerative.'

Important to acknowledge is the existing density profiles of cities throughout the developing world. The path dependency experienced by cities means that they have started growing in a very particular way. Given the impact of the automobile on the growth path of cities (Bertaud, 2004; Rode et al, 2014) as well as the rapid urbanisation of poorer people who are likely only able to afford to settle on the outskirts of cities, means that sprawling urban growth has become a dominant urban phenomenon throughout much of the developing world (Bertaud, 2004). With the urban growth being predicted across the developing world over the next few decades there is a real opportunity to ensure that such growth is accommodated in a vastly different manner. The point is that whatever growth patterns occur over the next decade will either shift growth pathways or exacerbate them. As Sussman and Gilat (2002) argue there is a real opportunity in the developing world to shift growth trajectories and according to them TOD and other land use transport integration methods could provide useful tools to achieve a shift to more sustainable development. They do not unpack further what they mean by other land use transport integration methods are.

<sup>22</sup><http://thecityfix.com/blog/medellin-metrocable-improves-mobility-informal-settlements-low-income-accessibility-equity-development-coby-joseph/>

Sussman and Gilat (2002) argue that Curitiba illustrates that TOD can occur in the developing world. They however, further allude to the fact that the TOD success of Curitiba was based on the somewhat unique institutional arrangement apparent through the influence of the long standing city mayor Jamie Lerner who was an architect and urban visionary. The mayor and his team were fairly autocratic in nature (elected into power by a military dictatorship<sup>23</sup>) and held the power to enforce zoning codes to achieve the densities which are now hailed as best practice. In reality such institutional autocracy is unlikely in South African cities, nor necessarily is desirable.

Suzuki et al (2013) also highlight the important role that the masterplan developed in the 1960s in Curitiba played in providing a long term vision for the city. Spatial planning and transport interventions which played themselves out over decades in Curitiba arguably influenced the growth trajectory of the city at a time when the urbanized population was relatively low. Since the late 1980s urbanization levels have grown rapidly across the developing world. Today that growth has been accommodated in one form or another. The overall city densities arguably highlight that Curitiba has not escaped outward sprawling expansion and increased vehicle ownership and use (Mang, 2015) and there are also critical reports that inclusive urban development have not been achieved where the poorest in the city continue to live on the fringes<sup>24</sup>.

The list of challenges that both Suzuki et al (2013) and Sussman and Gilat (2002) indicate are fairly similar. They point to mostly political, institutional and funding issues. It would seem however that Curitiba and many of the Asian countries profiled in best practice TOD in the developing world would have faced challenges in these areas of a vastly different nature given their particular political and institutional contexts. In reality it is quite challenging then to draw real lessons from such examples given the importance that has been placed on these critical enabling issues in the literature reflecting on implementation efforts.

Suzuki et al's (2013) and Sussman and Gilat's (2002) recommendations for TOD in developing world cities remain largely formal in their approach and arguably seek to provide a level of inspiration or hope that international conceptualisations of TOD are possible in other developing world contexts. While these examples are perhaps useful to showcase what is possible they seem to underplay the importance of the particular political and institutional underpinnings. Perhaps more importantly these highly formal insights neglect in certain instances the growing understanding that a large proportion of urban growth in the developing world will take place in informal settlements. Does this suggest that TOD can only ever be a highly formalised response? The next section explores literature which is emerging around potentially context specific approaches to TOD in contexts of informality and poverty.

#### 2.4.2 EMERGENT ADAPTIVE TOD APPROACHES?

There are emergent practices from parts of the developing world which are providing a seemingly adapted approach to TOD investment in areas of poverty and informality. I argue that these insights are particularly important in building an understanding of how a TOD agenda might begin to address the dualistic nature of South African cities. These are considered to be early exploratory insights into alternate possibilities.

<sup>23</sup> <http://nextcity.org/daily/entry/cracks-in-the-curitiba-myth>

<sup>24</sup> <http://nextcity.org/daily/entry/cracks-in-the-curitiba-myth>

#### 2.4.2.1 A self-built and social capital approach to TOD?

The reality is that many developing world cities have expanded rapidly over the past decade. This expansion however has arguably resulted in higher densities than those associated with North American outward urban expansion. Informal settlements house the vast majority of urban residents in much of the developing world (UN-Habitat, 2010). While these are not desirable environments to live in, it does seem that such environments often exhibit principled characteristics of TOD. They are relatively dense, mixed in land use (most often through informal trading activities), pedestrian prioritised (as few people can afford to own vehicles and housing units are tightly packed together) and inextricably linked to transit services (more often than not para-transit). Would such developments be classified as TOD? Perhaps not in the strict conventional sense but identifying the support required to elevate the living experience in such areas already developed and constantly densifying where people are largely reliant on public transport presents an opportunity. Two issues seem important to explore, the quality of the public realm in such areas as well as the living conditions generated by densification practices.

In South Africa where people have been provided with formal state based subsidised housing, more often than not households have densified housing stands informally through the development of backyard units (Gilbert et al., 1997; Crankshaw et al., 2000). This has arguably assisted the individual households economically who were able to densify often renting out units to tenants allowing them to derive an income as well as local transport services which benefit from a greater concentration of passengers (Charlton, 2004).

In some South American cities such as Bogota and Medellin, favelas (informal settlements) have become the key targets for some innovative transit investments and broader public realm improvements (Blanco and Kobayashi, 2009; Reed, 2014). There has been a sustained effort over the past decade in some cities to re-think the way informal settlements are understood, attempting to shift thinking away from informal settlements as temporary and problematic phenomenon towards seeing them as inevitable, dynamic and vibrant places.

In Medellin there has been high levels of state based co-ordinated transport and social infrastructure investment in favelas. The investment has been of the highest quality and given rise to the highest quality libraries, parks and community facilities. Together with high quality transport investment in cable car metro systems, escalators and pedestrian bridges (all tailored to suit the context) these areas have been dramatically transformed through targeted spatial investment (Blanco and Kobayashi, 2009; Reed, 2014). Furthermore the private sector has subsequently 'crowded in' on the back of such high quality public investment. The result is that once dangerous, violent<sup>25</sup> areas have become vibrant and attractive for all Medellin residents. These strategic transit oriented investment have created land use mixes which provide destinations (work and play) in previously origin (residential) based areas of the city. This is perhaps an example of an alternative TOD strategy suited to poorer informal areas found in the developing world context highlighting the power of co-ordinated public infrastructure investment in previously marginalised areas, but explicitly linked to transit investment. The Neighbourhood Development Programme initiated by the National Treasury in South Africa seems to be attempting to drive such co-ordinated public development, the results to date have

<sup>25</sup> Medellin was once considered the most violent city in the world

been fairly limited but the impetus is encouraging and will be discussed in the next chapter of the report.

Beyond this social capital investment by the state I am curious about the possibility to support households and individuals in such a way as to encourage and facilitate the safe 'self-densification' of poorer and informal areas?

A report published by the *Urban Land Institute* and *Centre for Liveable Cities* (2013) exploring principles for dense and liveable cities in the developing world draws on Singapore's experience in becoming a globally touted example of sustainable development. The content of the report shares close links to mainstream TOD thinking and is not in this sense a new contribution to approaching TOD. However, in response to the report Richard Florida wrote in an online article that the report 'is especially timely and useful given the massive urbanization that will occur over the next several decades. Hopefully the recommendations in the report can help these rapidly developing cities, especially those in the emerging economies and the "global south" develop more effective approaches to increasing density in ways that can simultaneously spur higher rates of economic development, while improving liveability for their rapidly growing populations<sup>26</sup>'. The idea of thinking through more effective approaches to increase density is central to the potential of exploring how the State can support the energies and investment strategies of poorer communities in building shelter options to develop more liveable environments.

In the Indian context Echanove (2013) provides insight and perspective on rethinking the understanding of 'informality' and self-built housing where he provides examples of more dense self-built housing that exhibited higher densities and a mix of land uses. There are many cases from around the world where communities supported by philanthropic organisations and in some cases the State are approaching the idea of self-built housing differently. I am exploring whether such an understanding could be applied to TOD thinking where the collective energies of communities looking to build their own housing can be supported and shaped to exhibit a form of TOD which responds more effectively to contextual realities in these areas.

In line with Suzuki et al's (2013) argument for the importance of articulated density it seems there would be much value in exploring support for 'self-densification' in and around public transport stations across South African cities such as those surrounding existing rail (Metrorail<sup>27</sup>) and BRT stations which are sometimes surrounded by subsidized housing (where investment in backyard units takes place) or informal settlements.

While this section is far from conclusive it does begin to highlight the important role of emerging global practices which think about development and investment oriented towards public transport in relation to the poverty and informality associated with developing world urban growth. I also argue however, that the mainstream approach to TOD will play an important role in developing world cities where there is large formal sector property investment, be it state or private based. In this regard there is a clear benefit of drawing on the lessons on offer from TOD implementation efforts in the developed world. The caution in this

<sup>26</sup> CityLab (2013) Density vs. Livability in the World's Biggest Cities, an online article by Richard Florida retrieved March 10, 2015, from: <http://www.citylab.com/work/2013/02/density-vs-livability-worlds-biggest-cities/4511/>

<sup>27</sup> Metrorail is PRASAs urban regional brand which is operated across all South African cities

regard is to be aware of the immense challenges experienced in wealthier nations of achieving effective TOD outcomes let alone inclusive TOD, where inclusive growth is argued to be core to the development in the developing world.

## 2.5 SUMMARY AND CONCLUSION

This chapter set out to provide a review of international literature on TOD with the aim of answering the following questions:

- What are the 'internationally accepted principles' of TOD?
- What lessons are provided from international TOD implementation experience?
- How does available literature assist in understanding the dualistic nature of South African Cities?

It seems that locating and understanding the principles of TOD has become fairly straightforward. Given the strong level of global knowledge and policy circulation it is unsurprising that much of the literature on TOD reflects a similar set of principles underpinning TOD. These are widely recognised and understood. I argue that it is important to recognise the growing prominence of income diversity and recognise it as a core principle of TOD. Especially given the emphasis placed on socio-spatial transformation in the South African context. The list of principles identified includes:

- an efficient, integrated and reliable public transport system
- a high quality public realm which prioritises pedestrians and cyclists over vehicles and ensures high accessibility to the public transport station or stop
- a mix of residential, retail, commercial and community land uses
- medium- to high-density development within comfortable walking distance of the transit station (i.e. the TOD precinct)
- reduced rates of private car parking
- A mix of income groups accommodated (this aspect is not necessarily mainstream but is increasingly reported as an important characteristic of TOD and believed to be essential in South Africa, see discussion below)

However, the chapter highlights that while the broad principles are easy to identify and understand it is the detail surrounding each of these principles and their application where many uncertainties and challenges lie. In this regard the review attempts to provide a detailed engagement with literature on each of these principles and distil what they mean as well as what the challenges are which surround implementation. It is fairly evident from the literature that the details of each of these principles are far less uniform and accepted than is suggested by the NDP.

Literature reflecting on implementation efforts has highlighted that for the most part results have not tended to be true TOD. Parking reductions and pedestrian realm improvements have not occurred and mixed income housing intentions have not materialised. The latter is particularly important to acknowledge and understand in a South African context where experience highlights that poorer residents have tended to be 'displaced' or 'replaced' in TOD. While the state might be able to subsidize some people, history in South Africa shows that it is

not possible to achieve this at the scale required to bring every household into the formal housing market in relatively cheap RDP housing let alone quality TOD environments.

It does seem that there have been some limited effective implementation efforts and there are significant learnings on offer. In many of the reported success cases there are a set of what I have termed land development dynamics which have required significant energy and focus. These are argued to be the critical enabling factors to inform detailed understandings and give effect to TOD success especially in the early stages of implementing the concept, these include:

- The political support and prioritization to:
  - Make tough decisions when outcomes are uncertain and have significant cost and time implications.
  - Champion the messages and communication efforts around trade-offs and benefits of decision making.
  - Drive co-ordination and collaboration with other stakeholders to ensure the adequate resources and decision making support is present.
- Institutional reform which assesses local context, capacity and skills to leverage the most effective working environment to pioneer and experiment while incorporating views of the range of stakeholders required for TOD success.
- Innovative approaches to financing which bring together a range of different sources of funding and finance to avail the resources necessary to complete projects and showcase their benefits.
- A framework which brings multiple actors into the vision making, planning and decision making around projects, explicitly acknowledging the need for contestation, negotiation and collaboration.

However, perhaps one of the most important points illustrated by this review is that there is no one size fits all approach to TOD and it is clear from the literature that much of the success experienced in TOD has relied on the ability to think through both the details of the physical characteristics as well as the enabling components in context. It is also evident that TOD remains a specialised form of development amongst the mainstream development processes associated with auto-oriented development patterns. Using specialised institutional arrangements and processes to incrementally build towards a more mainstream implementation of TOD based principles in regular development processes should be the long term goal. I have not come across any literature which includes thinking about fundamentally shifting the existing developmental process towards a more city wide practice which is TOD based. Even where efforts to realise TOD have been significant it seems that effective TOD remains the exception as opposed to the norm, often requiring exceptional amounts of divergence from traditional developmental practices and dependant on specialised finance, institutional and political arrangements.

Much of the existing literature tends to focus on TOD as a means to reduce levels of vehicle kilometres travelled and in the developing world curb the uptake of private motor vehicles. While there are admittedly a range of other benefits which TOD commentators argue are possible through the development of effective TOD, such as greater social and economic inclusion, a reduction of negative environmental impacts and improved health levels (Suzuki et al, 2013, Brookes, 2010). It is argued that these largely remain secondary relative to the private

vehicle travel reductions. Although such a focus does not necessarily compromise the ability of the other benefits it is argued that it has the possibly to miss the larger point in the developing world where social exclusion and poverty present some of the greatest challenges facing cities. Getting the balance correct between targeting vehicle owners, potential vehicle owners and public transport captive in developing world cities seems to be far more critical to the success of TOD in developing world cities.

The dualistic nature of South African cities means that the lessons provided from international literature are largely only of relevance for formal growth prospects. However, it is argued that part of the challenge is clearly about targeting the vehicle owning and potential vehicle owning populations in South Africa as Wilkinson (2006) and Marks and Wilkinson (2007) advocate (discussed in the next chapter). Furthermore there is relevant application of these formal processes in shifting the way in which public sector investment is channelled into providing housing for poorer people. Although these lessons should prove to be valuable to municipalities and other stakeholders interested in pursuing TOD it is worth noting that many of the developing world good TOD practices have occurred in political and government institutional contexts which are not reflected in democratic South Africa. An analysis of the particular land development dynamics in these cases are essential to reflect upon and are often not prominently acknowledged in the literature.

The available literature on TOD experience both in the developed and developing world does not seem to acknowledge the extent of informal growth projections in developing world cities where poverty will largely concentrate in informal settlements. The highly formalised, market based approaches to TOD, provide limited evidence of being able to accommodate such growth in a different manner than the mushrooming of informal settlements. While this is admittedly a variable that will make the already complex nature of TOD even more complex it is arguably important to consider. This identified gap in the existing literature on TOD prompted an investigation into additional literature and experience around land use transport integration in the developing world in such contexts.

The literature highlighted that there does seem to be emergent practices in the developing world which are leading to a nuanced understanding of TOD and how it can be adapted to better suit the contexts where poverty and informality is prevalent. However, much more research and documentation is required on these approaches and due to the limited amount of information the final section of this chapter serves as provocation to explore such possibilities further. From the available information it does seem that such an approach to TOD has a vital role to play in creating effective TOD environments throughout the developing world.

### 3 A SOUTH AFRICAN TOD LITERATURE PERSPECTIVE

#### 3.1 INTRODUCTION

This chapter will cover a South African based literature review intended to provide insight as to how the concept has been interpreted conceptually in the South African context. The South African based literature review will focus on existing policy, academic and practice based engagements providing an opportunity to reflect on the extent to which lessons and insights gained from international literature have been incorporated into understandings of TOD in the local context. Some of this literature has already been referred to in preceding chapters but will be covered in greater detail in this chapter.

As has already been stated, TOD is becoming a widely utilised concept in South African urban and transport policy. However, the concept remains relatively new in the local urban development arena when compared to the North American context. A scan of the property development landscape in South Africa indicates that there have been fairly limited TOD implementation efforts to date.

A brief discussion on the South African context will be provided. Then, given the series of critical lessons and insights listed above this section will look to provide a review of the available literature both academic and public policy based to get a sense of how TOD has been understood in the South African context. Across the country the concept has been drawn on and utilised to differing degrees over the past decade. This chapter aims to answer the question:

- How has the concept been understood in the South African context to date?

#### 3.2 A VIEW ON THE SOUTH AFRICAN CONTEXT

The South African socio-spatial context has been well documented and researched (see Harrison et al, 2008; SACN, 2011b; Turok 2012). The research has deliberately avoided a lengthy analysis of the South African socio-spatial context but it forms an important guiding factor of the research and South African based literature review. The distorted settlement patterns associated with apartheid planning have resulted in a spatial landscape which is extremely inefficient and deeply divided. During apartheid, transport systems were designed to facilitate segregation and discrimination. The predominant investment in transport infrastructure oriented to private vehicles, mainly in previously white areas, has exacerbated the poor levels of access and mobility in South African cities as the majority of individuals in marginalised communities cannot afford a vehicle. This legacy has stubbornly persisted in the post-apartheid era despite major transformative policy intent. Today South African city contexts are characterised by sprawling, relatively low-density, mono-functional development (driven by both private and public-sector investment), and largely facilitated by privately owned motorised transport (SACN, 2011, Turok, 2012), be it automobile or mini-bus taxis. This has resulted in a context where many poor people live extraordinarily far from places of economic opportunity and are forced to travel long distances for long periods every day (Behrens and Wilkinson, 2003).

It has thus been the impact of apartheid planning as well as global market forces which have led to extremely unequal and unsustainable spatial patterns. Globally comparative studies have highlighted that South African cities exhibit some of the lowest densities in the world (COGTA,

2013; Burgess and Jenks, 2002; Tonkin, 2008). From a transport-land use feedback cycle perspective South Africa, in many respects, followed American trends and for the second half of the twentieth century invested heavily in the provision of road and freeway networks for the private car with very limited investment in public transport systems. Today, the impacts are telling in that suburban mono-functional sprawl is the generally supported form of urban development (SACN, 2011 and Turok, 2012) equipped with stand-alone office parks, gated communities, low income housing developments and strip malls. While previously marginalised peripheral townships (where people remain largely transit dependant) are severely underserved by public transport. Even where public transport infrastructure exists services are very limited largely due to the high costs of providing high quality levels of service in expansive, peripheral, dormitory spatial patterns. This poor level of infrastructure and service availability has given rise to the proliferation of the minibus taxi which is the most utilised form of public transport in South Africa (SACN, 2014b).

From a property perspective the South African democratic government has invested heavily in the development of housing post-1994 and all signs indicate that this will continue. Thus the state continues to be a large investor in urban growth. The particular model for housing delivery has tended to be on peripherally located cheaper land and taken the form of RDP houses (small detached houses on single stands). The private property sector has almost completely transferred to a model based on private vehicle access (Turok, 2012). These in combination have exacerbated low density sprawling and mono-functional land use patterns. From an informal perspective many people have invested relatively substantial amounts of private capital into the development of informal neighbourhoods largely on open parcels of land on the functional edges of cities (Huchzermeyer, 2004; Huchzermeyer and Karam, 2006; Napier and Landman, 2010, Shapurjee and Charlton, 2013). It is argued that approaches to TOD need to consider carefully the various property investments which are made across South African cities to understanding all of the possible ways which TOD thinking could be relevant.

Despite the realities on the ground the rhetoric of post-apartheid urban and transport policy has demonstrated a strong understanding of the socio-spatial and public transport issues inherited from the past. The result has been a distinct policy shift towards prioritised investment in public transport and inclusive compact development (Wilkinson, 2006). Over the past decade or so the South African government has spent unprecedented amounts investing in improved public transport systems. These newly developed systems however carry a relatively small portion of the population. According to the 2013 National Household Travel Survey the vast majority of public transport users rely on the minibus taxi for transport (StatsSA, 2013). For the vast majority who are unable to afford private vehicles the flexible minibus taxi provides the most responsive form of transport to the travel demand of public transport captive users living in sprawling peripheral areas. This is important to note as unlike the American context, the vast majority of people in South Africa already rely on public transport. Not by choice, but simply because they cannot afford private vehicles. The developing world urbanisation analysis presented in the previous section indicates that this will persist. Thus, it is perhaps important not only to consider those vehicle owning or potentially future vehicle owning portions of the population in TOD application as part of the approach should be to celebrate those existing public transport users and ensure their experience is dramatically improved.

Approaches to TOD thus have a slightly different contextual reality to engage in South Africa. It is argued that if they are to succeed in transforming the manner in which people live then they will have to accommodate both the poorer existing public transport users to ensure that they continue to use public transport out of choice regardless of their income levels as well as get the wealthier car driving population to drive less vehicle kilometres. These are important factors to consider when locating South Africa within a global land use-mobility discussion. While this is admittedly a simplistic interpretation of what is a very complex and nuanced landscape it is argued that it captures the dualistic nature to which Wilkinson (2006) refers.

### 3.3 ACADEMIC AND THEORETICAL ENGAGEMENTS

Since the early writing of Wilkinson (which has been a key informant to this research) there does appear to be additional support for the notion that TOD presents opportunities to achieve broader policy objectives in South Africa (Steer, 2012; Van Wyk, 2011, SACN, 2014b). It is argued that TOD has gained greater traction as tool to achieve socio-spatial restructuring. This is evidenced through the concept increasingly being explicitly drawn upon in policy, strategy and planning with this broader socio-spatial objective explicitly noted. This will be illustrated and discussed later in this chapter. There has also been a noticeable increase in the literature on the topic locally. An overview of the literature highlights the evolving thinking around TOD in the local context. There has been a clear advocacy for the relevance of TOD in South Africa which in many ways still continues. This is an effort to bring attention to the potential benefits of the concept. Then there seems to be a set of early reflections on TOD outcomes. More recently there is an emerging body of work which is attempting to work through some of the more detailed understandings about what it means to pursue a TOD agenda. This section will discuss the literature according to these three broad categories.

#### 3.3.1 PROMOTING TOD AS RELEVANT IN SOUTH AFRICA

From a scan of literature it appears that Wilkinson (2006) was amongst the earliest commentators on TOD in South Africa. In exploring the applicability of concept he indicated that South African policy makers had not drawn on the TOD concept explicitly but argued that it seemed to align strongly to the corridor and nodal principles which were being drawn on to achieve broader socio-spatial restructuring goals. In support of this thinking it is now evident that a number of projects and plans initiated under the corridors and nodes planning lexicon in the early 2000s are now often reported with links to TOD in Spatial Development Frameworks (SDF). Examples include Cato Manor in eThekweni and the Lansdowne Corridor in Cape Town.

Wilkinson (2006) went further to argue that while the concept presented a potentially useful approach to achieve socio-spatial transformation it would need to be adapted to suit the polarised South African urban condition. It was his understanding that different approaches would be required in poorer townships and informal areas than those required in wealthier suburban areas. Wilkinson (2006) argued that poorer areas presented a more immediate and perhaps strategic opportunity to explore TOD than wealthier areas as it was not inconceivable that the affordable and subsidised housing delivery provided by the state could be altered in such a way as to be dense and transit oriented.

Markewicz, Linders and Moodley (2011) writing on achieving the goals of compaction in eThekweni argue that TOD represents a useful tool to achieving urban policy objectives. They list the physical principles of the concept, and then provide some insight into what is required to

achieve TOD. They identify the alignment and co-ordination of all stakeholders' energies (although do not specifically stipulate who all stakeholders might constitute), sector department plans and call for the development of detailed precinct plans where rezoning might be required. Such insight implicitly highlights that some of the issues associated with TOD implementation have been identified in the South African context. This is argued to be critical to advancing a TOD agenda in South Africa. The paper does little to go into more detail on these issues and identify what these suggestions mean in the current context of municipal planning in the EThekweni context.

Van Wyk (2011) argues that the Gautrain stations missed the opportunity to facilitate TOD and have built stations as nodes (maximising the efficiency of the transit system) rather than places (creating stations which facilitate public gathering and civic engagement). The prioritisation of parking provision on strategic station adjacent land highlights this. This view is supported by Steer (2012) who argues that Gautrain stations present many opportunities. While Van Wyk (2011) promotes TOD as a strategic tool to improve lower income earners access to affordable housing and improve residual incomes, this perspective perhaps fails to acknowledge the difficulty in developing affordable housing in TOD. The point here is not to dismiss the idea but rather to indicate that, relative to international experience, if it is to materialise it will require a concerted and focused effort from a range of different stakeholders. This is not evident in the literature and thus the approach is argued to be limited.

### 3.3.2 REFLECTING ON OUTCOMES

It is perhaps not a coincidence that the increased interest in TOD has coincided with an unprecedented level of public transport infrastructure investment in South Africa. There is a growing body of literature developing around the link between TOD and the rail systems<sup>28</sup> (both the PRASA Metrorail as well as the Gautrain). Such a link is unsurprising in many respects as traditionally high quality higher speed rail services have been associated with TOD (Currie, 2006). However, commentators are now advocating that BRT systems present many opportunities for TOD investment (Cervero and Dai, 2014; Cervero, 2013; Cervero and Kang, 2011; Currie, 2006; Hook et al, 2013). It is arguably clear that the globally reported potential of TOD for these various modes (rail and BRT) has filtered into South African thinking. This is predominantly from a point of potential application but in certain cases there is already some research and writing around the extent to which TOD is being developed in South Africa.

In a paper published online Steer (2012) provides an analysis of TOD in a South African context. He presents the Bridge City development in EThekweni as a pioneering TOD in South Africa. The development is a mixed use scheme containing a shopping centre and a residential component with planned rail extension with a station underneath the shopping centre. However, Steer (2012) points out that the residential component stalled because 'Current housing prices and construction costs make private residential development unattractive to commercial developers (Steer, 2012: 11). Thus, it seems the project represents more of a TAD as the residential component did not materialise. According to Steer (2012) this is where government and NGOs need to fill the gap in finance available for affordable residential development. This arguably supports the call by Wilkinson (2006) to focus TOD in poorer areas where existing housing

<sup>28</sup> South Africa has a National Rail Network operated by PRASA as well as a more contained Gauteng Provincially operated network in Gauteng.

An observation of development activity highlights that there is clear evidence that property investors see value in investing around the Gautrain station and furthermore there is indication that the Gautrain is generating an appreciation of the benefits of developing in close proximity to high quality transit systems with wider property development audiences. A number of developers have marketed their developments with the close proximity to transit. The majority of these new developments remain commercial in nature and where residential properties are developed they are highly exclusive. In reality these developments are more TAD in nature and

often still prioritize private vehicle access<sup>29</sup>. However, there are potentially useful lessons to be drawn from this surge in development around Sandton and Rosebank Gautrain stations.

The BRT stations in South African cities present arguably less property market opportunities (as outlined by Mushongahande, Cloete and Venter, 2014). I argue that this could be influenced by the median station design which Suzuki et al (2013) and Cervero and Dai (2014) have indicated might be problematic for yielding property investment responses, as well as the preconceptions and prejudices associated with bus travel in South Africa<sup>30</sup>, and also the location in (often poorer) existing suburban areas where a more complex redevelopment agenda is required (Belzer and Autler, 2002). As networks expand the locational aspects might begin to change but the design of stations looks to remain in the median and should be something which South African Cities look to re-evaluate sooner rather than later.

In a study on the impact of the Diepkloof Rea Vaya BRT station in Soweto, Johannesburg Bickford (2014b) indicates that while there are clear access and mobility benefits for those able to use the system, the impact in terms of property and business development activity are less evident. This perhaps reflects the difficulty of driving TOD development in poorer areas as reported by Belzer and Autler (2002). Furthermore it offers support to the idea that challenges exist around TOD as most transit is provided in built-up areas and would require redevelopment processes as opposed to greenfields development. The only major property investment evident in the area was a large big box shopping centre<sup>31</sup> complex developed three years after the BRT station and system was operational. Unlike the bridge city development the Diepkloof square shopping complex shared no links with the transit system. Bickford (2014b) argued that it was not inconceivable that the retail development could have provided an opportunity to test a TOD typology for retail investment in South Africa especially since it was a City of Johannesburg driven venture. Similar to Bridge City however the intended residential component of the project failed to materialise (Bickford, 2014b).

Reflective studies are critical to advancing an effective TOD agenda. They bring awareness to the concept but also ensure that reported TOD outcomes are consistently being interrogated. To date it does seem that no truly principled TOD project has been pursued to completion, but there is evidence that some of the barriers are being identified and are in line with international insights. In many ways the limited outcomes are argued to be a reflection of the inability to work through some of details and complications distilled in chapter 2. However, there are signs that such work is beginning to take place in the local context.

### 3.3.3 EMERGING STUDIES EXPLORING TOD DETAILS

There are encouraging signs that South African practitioners and academics are beginning to engage with the detail of some of the TOD issues discussed in the previous chapter. Overall the research remains fairly limited but studies have been identified on relatively detailed

<sup>29</sup> Katherine and West development is a mixed use high density development within 100 meters of the Sandton Gautrain station <http://www.moneyweb.co.za/archive/almost-half-of-katherine-and-west-development-sold/>

<sup>30</sup> A phenomenon that Taras Grescoe (2012) highlights is common throughout the United States as buses are conceived to be a mode for the poor, elderly or unlicensed.

<sup>31</sup> Big box shopping complexes are designed predominantly for private vehicle access and mobility and have become a form of major retail property investment in American cities, and subsequently throughout the world

interrogation of density linked to public transport as well as a study outlining the process of a mixed-land use development (although not specifically transit linked). Also there is a broader study which provides insights into some thinking about what might be required in the South African context across a range of different areas in order to achieve effective TOD.

Marks and Wilkinson (2007) provide a study of significance in thinking through how TOD might be applied across the varying contexts of South Africa. They argue that from a strategic perspective applying TOD targeted at the gap housing market<sup>32</sup> presents an area of opportunity to curb the increase in private vehicle travel as this is argued to be the same income bracket where households enter vehicle ownership. By targeting TOD at the gap housing market the argument is that people can continue to use public transport and have access to well located (from a public transport proximity perspective) shelter options.

The Marks and Wilkinson (2007) study begins to explore how TOD could be approached in a South African context. However, it also poses many questions around the nature of TOD and perhaps represents an oversimplified approach to TOD. Reducing TOD to particular residential focus for a specific income bracket and not providing enough attention to the complexities of developing a mix of land uses, and improving the pedestrian experience and quality of the public realm. While there is a challenge of aligning housing delivery and public transport infrastructure in South Africa, TOD attempts to move beyond alignment and shift the manner in which property investment takes place. The idea that the gap housing market should form a strategic component of TOD in South Africa is argued to be something worth exploring further. However, this should be explored in tandem with a number of additional elements such as bonded housing, self-built housing (Napier and Landman, 2010) social capital investment, public realm upgrades similar to those of Medellin. This might require both public and private funding and financing and one of the major criticisms of housing delivery in South Africa has been the severe under investment the public realm (Ewing, 2005). Ewing (2005:1) makes interesting connections to the principles of low-income communities in South Africa stating that 'in low-income housing areas the primary spatial structure should consist of positive public spaces, green systems, transportation networks with emphasis on non-motorised transport, community amenities and human-scale local interventions for informal and formal economic and social activities, where there is potential for mixed-use opportunities.' Such insight, while not TOD explicit, arguably draws on the principles of TOD and makes a strong case for the need to drive social capital investment around public transport in poorer areas. This is argued to be critical work which needs to be further explored in more detail in association with TOD.

Grey and Behrens (2013) begin to ask questions of the sustainability and feasibility of BRT corridors specifically in the Cape Town context. Based on a model developed to assess the density required to provide sufficient passengers to support financially sustainable BRT operations they argue that it is unlikely that the development surrounding the first phase of Cape Town's MyCiTi BRT system will be able to produce the passengers required to match the transit capacity viable in the short to medium term. As such they propose that a complimentary set of instruments be introduced to manage travel demand patterns and incrementally shift suburban development approaches. Cooke and Behrens (2014) go further to discuss the

<sup>32</sup> The GAP housing market are those households who earn too much to qualify for subsidised housing but too little to qualify for a home loan.

All of this emergent literature illustrates the evolution of a more detailed TOD thinking taking place in the South African context. This presents a positive step in the manner in which practitioners and academics are starting to get to grips with what it might mean to drive a TOD growth agenda. It also illustrates that some international lessons are being picked up but I argue that international experiences and lessons available are not being reflected on and considered extensively enough. It is clear that much more research and insight into the broader range of details, challenges and opportunities is required.

The increase in the body of literature emerging around TOD has in many respects coincided with the increasing prominence of the term at a policy level. A review of policy over time

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highlights that TOD was developed at municipal level and seems to have fed up to provincial and national levels. This section will provide an overview of how the concept is being understood at a policy level and reflect on the extent to which the evolution evident in the literature unpacked previously as well as international lessons are being reflected in policy.



### 3.4.1 TOD AT LOCAL GOVERNMENT LEVEL

Wilkinson's writing on TOD in South Africa was happening just at the time when TOD was filtering into urban policy thinking in South Africa. I remember attending an open public participation meeting on the proposed BRT development down Oxford and Rivonia Road at the City of Johannesburg in 2007. I was in my first year as an urban planning student. The city planning officials presented a conceptual framework of the Bus Rapid Transit (BRT) route and how possible re-development along the route would be oriented to the station, like 'beads on a string'. I remember it being referred to as Transit-Oriented Development and I was convinced that this was a brilliant idea.

To my current understanding this was the first explicit public policy based introduction of TOD. There had long been an emphasis on land use transport integration and the densification along public transport corridors with a mix of land uses, but no mention of TOD (which contains these principles but goes further). Since that time the concept has been included in municipal policy, strategy or plans to varying degrees. TOD has become a 'buzz word' of sorts amongst urban development practitioners and policy makers. A desk stop scan was carried out to establish the extent to which various municipalities across South Africa have drawn on the term, the details of which have been captured in Annexure B.

A review of all municipal Integrated Development Plan (IDP), Integrated Transport Plan (ITP) and other strategy or planning documents available online indicates that there is a clear presence of the TOD term in some of the metropolitan municipalities' policy. However, the prominence and detail varies significantly. The larger metros of Johannesburg, Tshwane and Ekurhuleni seem to have drawn on the concept in their IDPs. Johannesburg, Cape Town and Tshwane have drawn on the term in their ITP. All of the municipalities seem to have indicated that TOD presents an opportunity to drive socio-spatial restructuring. It is clear that Johannesburg has drawn most prominently on the concept and achieved consistency by including it in both the IDP and ITP where it is included as the overarching strategic objective, highlighted by the statement in the Strategic IDP explaining that,

'The key strategy is Transit-Oriented Development (TOD), which is to create strong high-frequency public transport corridors and to promote residential density along them and complexity of land use in the nodes on these corridors through attracting density and mixed-use developments to them.' (City of Johannesburg, 2013:50)

It has also associated phrases like 're-stitching our City'<sup>34</sup> when referring to the potential of TOD, highlighting the prominent objective of socio-spatial restructuring. These resonate strongly with Wilkinson's (2006) view that TOD presents a potentially useful tool to restructure space in South Africa.

Of significance is the extent to which the other cities that have not drawn on the TOD term explicitly but include the concepts of corridor and nodal development based on the principles of higher density and mixed land use. Wilkinson (2006) argued that due to the prominence of these terms in policy and strategy that TOD was a concept closely aligned to these objectives. Perhaps the other cities or city departments are yet to include TOD in to their policy rhetoric

<sup>34</sup> City of Johannesburg (2012) Corridors of Freedom promotional document

When exploring the detail present in municipalities' documented understandings of TOD and their role it is immediately evident that the term has been identified as aligning to land use transport integration objectives. Unfortunately, many references to the concept in municipal documents do little to go beyond the term and the broad benefits it presents. In some cases the basic principles of TOD are presented but little is done to interrogate what achieving this might entail, where the challenges lie and what will need to happen to achieve such principles. However, there are some signs that cities are beginning to get to grips with what a TOD means and the most advanced understandings perhaps unsurprisingly exist in the two municipalities who have fully operational BRT systems underway. As mentioned in the introduction these systems are facing immense financial pressures as the operating costs far outweigh the fare-box revenue generated<sup>35</sup>. Municipalities have long understood the conceptual inefficiencies of the spatial patterns of cities but actually operating public transport systems in these spatial conditions bares the harsh financial realities of these inefficiencies. It could be argued that Johannesburg and Cape Town are realising that changing the land use environment is key to public transport efficiencies and are thinking seriously about what TOD presents and what it will take. In the available documentation there is some evidence that these cities might be beginning to reflect on some of the critical enabling factors which have emerged from international experience.

‘To achieve the objectives of the Transit Orientated Developments strategy (refer to Chapter 4) in support of the public transport network, TCT needs to investigate partnering with developers and business to enhance the mixed use offering (commercial / retail uses) over, under or adjacent to public transport hubs in such a way to generate revenue to help offset the public transport operating deficit.’ (City of Cape Town, 2013:238)

<sup>35</sup> <http://www.cnbc africa.com/news/southern-africa/2014/10/22/south-africa-mid-term-budget-transport/>

authority to be the driver of TOD is unclear and needs to be explored further. The risk is that the thinking on TOD is perhaps limited to a specific unit within the transit authority who does not hold the mandate and capability to drive complex TOD projects within the municipality.

In the case of the City of Johannesburg a somewhat different approach is evident. It seems the municipality has been able to institutionalise TOD as a key strategic focus for all municipal departments. Along with TOD being the entire strategic focus of the IDP there has arguably been some important additional steps taken towards co-ordinating planning within the municipality for TOD. The 2015/16 operating budget highlights how some departments budgeting priorities have been linked to achieving TOD outcomes. However, it is unclear from the ITP and IDP documents in the municipality the extent to which the major barriers and enabling issues have been identified and understood. This will be discussed in detail in the next chapter.

These emerging signs illustrate that within municipalities TOD is gaining significant traction as a way to transform the apartheid city logic by anchoring urban development around public transport investment. However, the international experience highlights that identifying the in-principle benefits of TOD is the straight forward component, the more significant challenge is working through what a TOD growth agenda means from a political, institutional, financial and stakeholder engagement perspective in a particular context. It seems that little has been done around these details and much work is required. This will arguably benefit those municipalities which have not identified TOD specifically but are reliant on achieving similar TOD principles. The international literature also highlights that municipalities have a prominent role to play and are consistently one of the major stakeholders but that no single entity can achieve effective TOD alone. This is identified clearly by Cape Town in their ITP based TOD strategy, but the extent to which this has translated into a multiple stakeholder collaboration is unclear. Another important set of stakeholders are provincial and national spheres of government and it would be useful to assess the extent to which the TOD presence in municipalities is supported in other spheres.

### 3.4.2 TOD AT THE PROVINCIAL GOVERNMENT LEVEL

TOD specific writing at a provincial level is seemingly less prominent. The two provinces where TOD is clearly discussed is in Gauteng and the Western Cape. One could argue that this coincides largely with the municipal review where it is within these two regions which the majority of public transport investment has taken place. The Gauteng province is responsible for the operation of the Gautrain and thus has a clear vested interest in the property and land development around stations. TOD forms a prominent component of both the provinces spatial planning as well as the 2013 Integrated Transport Master Plan 2055. Unsurprisingly perhaps the spatial planning seems to be poorly aligned to the City of Johannesburg's BRT based TOD approach but rather focuses more prominently on the Gautrain. This provides useful indication of the competing interests of various transit operators which exist in the province where PRASA, Gautrain Management Agency and Rea Vaya are operated at each of the three spheres and are all driving separate TOD agendas which best suit their individual interests.

The Western Cape has provided less detail on the role and nature of TOD simply listing it as an important spatial strategy. With the enactment of the Spatial Planning and Land Use Management Act (SPLUMA) in 2015 the role of provinces in guiding and shaping and approving development is going to be less so than it has been in the past (SACN, 2012). However from an

alignment and support perspective on TOD the role of the province is critical. This will especially be the case in Gauteng.

### 3.4.3 TOD AT THE NATIONAL GOVERNMENT LEVEL

TOD is being drawn on explicitly in certain national government departments and surprisingly not so in others. The National Planning Commission makes clear reference to the potential of the 'internationally accepted principles of Transit Oriented Development' in a South African context and does not go beyond this statement. National Treasury, the department with an eye on the fiscal environment of South Africa, in some internal units is drawing explicitly on the concept as a way to achieve spatial efficiencies. Perhaps most surprising is the lack of engagement with the term in national housing and transport departments given that it is mentioned in the NDP and increasingly mentioned within these departments at local and provincial government levels. If national departments are supposed to play guiding and supporting roles then an awareness of the detail surrounding the promotion of TOD agenda will be useful. The following section briefly discusses some of these issues.

#### 3.4.3.1 The National Treasury

National Treasury is increasingly looking at the spatial land scape of South African cities as it is understood to be a key source of fiscal inefficiencies. There are a number of entities within treasury that have been promoting TOD explicitly. The National Treasury Neighbourhood Development Programme (NTNDP) which is exploring strategies of developing more vibrant urban neighbourhoods in poorer areas and what they term 'urban hubs'. TOD is forming a prominent component of the unit's Urban Network Strategy. Some of the early work which has emerged from the unit highlights that TOD thinking is along similar lines of the 'urban acupuncture' based development experienced in Medellin. The challenge is that the unit does not necessarily hold the powers and functions to implement strategies. However, I argue that the NTNDP could provide an important fund to drive a more nuanced social capital based approach to TOD. Yet the current thinking emerging from the unit does hold some promise around adapted TOD thinking.

The South African Cities Network (2011) in partnership with the NTNDP conducted a study on *creating and capturing value around transit nodes* the study refers explicitly to TOD as an approach to generating value around public transport stations in South Africa, 'In South Africa, transport interchanges such as the Gautrain, the Bus Rapid Transport system (BRT) linked with the mini-bus taxi system provide perfect opportunities to adopt a TOD approach.' (South African Cities Network, 2011: 6). There is however no acknowledgement of the challenges which have been associated with the application of the concept internationally. Nor an acknowledgement that the concept might require adaptation to better suit the variety of contexts which transport systems traverse in South Africa.

The City Support Programme (CSP) also a National Treasury based unit is responsible for enable improved integration across built environment investment and implementation with the aim of developing more compact and sustainable cities. CSP is mandated to support cities by developing required capacity, effective institutional arrangements and supportive finance to enable city governments to shift towards more sustainable and efficient urban development. Metropolitan municipalities are required to prepare Built Environment Performance Plans (BEPPs) with the aim of more strongly aligning sectoral based planning within municipalities.

CSP is also drawing explicitly on the TOD concept in their strategies to offer support to metropolitan municipalities. At a TOD workshop held in Johannesburg CSP provided a presentation highlighting National government role in supporting TOD. Where it was highlighted how both CSP and NTNDP are actively supporting TOD approaches in Cities (National Treasury, 2013). It is thus critically important that these two support units of the National Treasury (NT) are well versed with the lessons and insights on offer from international experience in TOD efforts. To date there is limited evidence that they have incorporated the detailed outcomes of international experience into their thinking, but there is encouraging signs that NTNDP is beginning to think through how TOD might begin to apply in poorer areas of South Africa.

The National Department of Transport (NDoT) has not drawn explicitly on the TOD concept in policy or strategy documents produced since 1994. However, inefficient, mono-functional, low density sprawling spatial patterns have consistently been identified as a leading cause of transport challenges in South African transport policy. As such policy has called for the implementation of more compact mixed use development structured around public transport and simultaneously called for the prioritization of public and non-motorised transport (NMT) users. When read together these objectives are closely related to the principles of TOD as indicated by Wilkinson (2006). Somewhat surprisingly, TOD has never been included in any transport policy and strategy documents, even in more recent times. Even the most recent National Public Transport Strategy and associated Action Plan developed in 2006 and 2007 respectively do not make any particular reference to TOD but both call for the densification of mixed use, mixed income land uses at major Integrated Rapid Public Transport Networks (IRPTN) nodes. To this end the strategy calls for the improved 'interdepartmental coordination with regard to housing, land use and transport' (Moodley and Seedat, 2007: 405). Along with the call for high quality non-motorised transport networks the link between TOD and the strategic thrusts are evident.

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The Passenger Rail Agency of South Africa (PRASA) (an agency under the auspices of the NDoT) however is explicitly drawing on the concept in their strategy thinking. According to the City of Johannesburg (2013: 33) 'Its (PRASAs) stated goal is to upgrade the existing rail network in high-volume corridors so that it can play a key role in transit-oriented development in the city and act as a quality mass carrier'. The details of what this means are not entirely clear and I am unable to find any documentation which explicitly outlines a plan or intent for TOD across the PRASA network. The stakeholder analysis provided later in the report begins to engage with some of the detail around what PRASA understands TOD to mean.

#### 3.4.3.3 The National Department of Human Settlements

The Integrated Residential Development Programme (IRDP) listed in the housing code (Department of Human Settlements, 2009) builds on the BNG and calls for residential

<sup>37</sup> Gauteng City Region Observatory monthly map.

### 3.5 SUMMARY AND CONCLUSION

The encouraging signs are that within the existing writing the research and investigations around the concept are dealing with TOD in different ways and I argue that the diversity in research and writing is positive. There is clear literature which makes the case for TOD and calls for adaptive thinking, some early reflections of the impacts of transit investment and TOD efforts as well as more detailed investigations of density and improved land market understandings.

There is some promise that some of the more detailed issues are beginning to be at least recognised at a municipal level. City governments are arguably leading the way in TOD policy and strategy thinking in South Africa and most prominently drawing on the concept. It does seem that the concept has been understood in most cases as a way to achieve socio-spatial restructuring objectives and ensure the financial viability of newly developed BRT systems. This arguably represents an ambitious and adapted conceptual understanding of TOD when compared to the vehicle reducing focus associated with the initial conceptualisation and will require careful consideration in light of the lessons provided from international experience. The significance of this shift in TOD focus is not clearly acknowledged in any of the literature, the importance of which is to understand the implication relevant to what this might mean for carrying out a TOD agenda with a slightly nuanced set of intended outcomes.

Currently it appears that there is poor alignment of the various TOD agendas across the three spheres of government. This is a worrying sign when one considers the lessons surrounding the difficulties experienced internationally in implementing the concept. To have three disparate TOD agendas focusing on different modes in an individual manner is certainly alarming. Based on international experience it is clear that the energies of the three spheres will need to be aligned to ensure that there are focused efforts and more co-ordinated messages of intent. This becomes particularly important when engaging with other stakeholders as a differentiated message to the market and civil society can be confusing and complicated to enter.

It must be acknowledged that there remains a widespread understanding of the transport land use feedback cycle, in that most documents reviewed dealing with urban development and transport thinking the principles of densification and compaction are associated with efficient public transport use. The findings of this review arguably support Wilkinson's (2006) that TOD represents a highly valid strategic concept to achieve these objectives. However TOD has not been drawn on explicitly in every city across South Africa. While the use of the term is perhaps not important, it is argued that the detailed lessons learnt from attempting to implement the principles associated with TOD are highly valuable for those aiming for compaction, inclusion and NMT prioritisation.

This high level analysis of the understanding of TOD across South Africa perhaps highlights cause for concern in that it can be argued that the principles of TOD have long been pursued in urban policy and strategy with limited outcomes. The growing prominence of TOD perhaps represents a more focused effort to drive these principles, however attaching a global catch phrase will not necessarily lead to improved outcomes. It is argued that there is a real need to draw on lessons and interrogate how these might apply to the South African context. This potentially highlights the need for more effort to be focused on the land development dynamics which international experience highlights as the critical enabling factors to achieving effective TOD.

Furthermore the review highlights that inclusive growth is at the forefront of policy objectives across all levels in South African. There is major emphasis placed on the development of dense affordable or low cost housing in central locations and around public transport. This intervention is seen as critical to socio-spatial transformation and is often intertwined with TOD understandings. However, experience internationally illustrates that achieving well located affordable housing in TOD has been exceptionally challenging. Acknowledging that South Africa does have a subsidised housing programme which sees the state play a role as a key property investor and holds promise that affordable housing can be funded by the state in TOD areas. The misalignment of human settlements policy and thinking relative to this object is a major concern. Given the high cost, longer time and greater complexity of driving TOD such misalignment will not aid the goal of achieving effective TOD. Regardless of this the understanding that affordable or subsidised housing can occur at scale required to achieve wide-spread socio-spatial transformation in South African needs to be revisited. The majority of households in South Africa fall within or below the affordable housing income bracket (Statistics South Africa, 2011).

A major gap in South African literature currently is the lack of engagement with the major challenges associated with achieving TOD which have been outlined from international

By basing the entire IDP on the TOD based 'corridors of freedom' vision and aligning key departments budgeting around investment in the corridors the City is prominently linking TOD as the strategic development tool to achieve broader objectives of socio-spatial transformation. This is a bold and unprecedented approach and signals the extent to which Johannesburg is taking TOD seriously. This emphasis arguably provides a unique opportunity to assess the TOD concept in Johannesburg to gain a more detailed understanding of how it is being understood in a South African context. Important to note is that no municipal entity is able to drive TOD in isolation of other actors, while this has arguably been identified in some of the limited writing in the South African context there exists no detailed analysis of what a collaborative multiple-



stakeholder approach to TOD might entail in the South African context. The next chapter of the report will provide an assessment of the City's urban policy as well as a stakeholder analysis of a range of potentially influential stakeholders for TOD in the city.

## 4 A CASE STUDY OF THE CITY OF JOHANNESBURG

### 4.1 INTRODUCTION

This chapter will focus on the Johannesburg case. As has been indicated in the previous chapter the City of Johannesburg has placed TOD at the centre of their strategic development agenda. A discussion on the TOD based policy evolution will be followed by a critical analysis of the 'Corridors of Freedom' visioning and planning documents. A stakeholder analysis then provides insights from various stakeholders' understandings and views of TOD.

In order to gain more acute insight as to how TOD is being understood in South African contexts, the case of the City of Johannesburg's recent TOD strategy dubbed 'corridors of freedom' is argued to provide the highest level of insight around current South African based TOD thinking to date. While an in-depth review of the existing visioning and planning documents will provide useful insight, this will be supplemented by stakeholder analysis. The basis for such an approach is straight-forward, if TOD outcomes ultimately rely on a multiple stakeholder approach and buy-in to be effective then a true understanding of how the concept is been understood in South Africa would require a perspective on the views of other stakeholders. More specifically this chapter will seek to critically discuss and answer the following questions:

- How has TOD been interpreted in the City of Johannesburg?
- Who are critical TOD stakeholders in Johannesburg?
- How have the key stakeholders in Johannesburg understood the concept in general and their respective roles in driving TOD forward more specifically?
- What are understood to be some of the major barriers to achieving TOD in Johannesburg?

### 4.2 CITY OF JOHANNESBURG: A HISTORY OF TOD PRINCIPLED URBAN STRATEGY<sup>38</sup>

The 'Corridors of Freedom' vision is rooted in a series of growth and development strategies which emerged in the City of Johannesburg. Local government spent much of the 1990s undergoing vital institutional reform and therefore Johannesburg was only really in a position in the early 2000s to begin addressing the spatial challenges which the municipality faced. In 2001 the city began to grapple with the idea of an urban edge, what they have referred to as an urban development boundary (UDB). In 2002, both the province and the City of Johannesburg had implemented urban edges. The concept was then included in the Johannesburg IDP and SDF of 2003/2004.

The UDB seemed to provide the 'backbone' of the City of Johannesburg's response to the spatial challenges faced by the city. It was fundamentally an invisible line drawn around the city that delineated where the right to develop land ended. Therefore the city identified that the spatial challenges presented to them were largely based on the vast amount of cheap developable land

<sup>38</sup> The 'Corridors of Freedom' vision is rooted in a series of growth and development strategies which emerged in the City of Johannesburg. Local government spent much of the 1990s undergoing vital institutional reform and therefore Johannesburg was only really in a position in the early 2000s to begin addressing the spatial challenges which the municipality faced. In 2001 the city began to grapple with the idea of an urban edge, what they have referred to as an urban development boundary (UDB). In 2002, both the province and the City of Johannesburg had implemented urban edges. The concept was then included in the Johannesburg IDP and SDF of 2003/2004.

that spanned out on the cities edge. Thus, the City identified a need to intervene in the land market by limiting the supply of land available for development. It attempted to combat urban sprawl and could then focus on shaping and directing development into key areas within the UDB and the city. The UDB was not however the obvious and absolute solution to combating urban sprawl and this becomes evident in the Growth and Development Strategy (GDS) released in 2006.

#### *4.2.1 THE RELEASE OF THE GDS IN 2006: REAFFIRMATION OF THE CITY'S COMMITMENT TO THE URBAN DEVELOPMENT BOUNDARY*

The GDS was formed at a stage when the City had released a number of key policy documents of which include the Joburg 2030 document of 2002, and the Human Development Strategy (HDS) document of 2005. These documents provided useful insights into the future development of the city, however they were underpinned by different perspectives and ideas about growth and development. The GDS was an attempt to merge the documents together and extract the positive elements of all of the documents into one coherent document.

The first GDS was informed by six principles, one of which was the principle of settlement restructuring, these principles were detailed in the development paradigm chapter of the GDS. A development paradigm is explained to be the expression of the core values of the city when making current and future decisions. This principle explicitly started unpacking how the city viewed the spatial challenges that it faced. The principle of settlement restructuring highlighted two important points. Firstly, it expressed that the cities decision to adopt an urban edge was subject to criticism over the years from its inception. Secondly, in line with these criticisms it reaffirmed the strategic decision to implement the UDB and highlighted that the city accepted and was aware of the criticisms that the concept of an UDB had generated (City of Johannesburg, 2006).

The GDS 2006 provides evidence of the conundrum that the City of Johannesburg was presented with when attempting to deal with the settlement challenges that it faced. On the one hand it recognized the locational cost implications, for both poorer residents and the City, that continued urban sprawl presented. Whilst on the other hand it recognized that land and property price increases would accompany the limited supply of developable land. It has been argued that this increase in land and property prices made it more difficult for poor people to access well located housing options and that the net result of an UDB was that poorer people were squeezed either out of the city or into derelict inner city buildings (City of Johannesburg, 2006). There is inherent mobility and accessibility implications in the manner in which the city understood the challenge faced by implementing a development boundary.

With both of these consequences in mind the city took a long term view and weighed up the long term benefits against the short term costs from both the municipality's and residents point of view. The outcome was that the city strongly reaffirmed the implementation of the UDB with the commitment to ensure that every effort would be made to actively absorb the poor into the city inside the UDB. In this regard the GDS 2006 highlights the inclusionary emphasis which has existed within the City. It is noted however in the GDS that this can only be achieved if there was a significant increase in mixed income, medium to high density residential and mixed use developments in specific nodes along major transport corridors in the city. The GDS explicitly notes that the city will focus on bringing jobs closer to the people and people closer to the jobs



(City of Johannesburg, 2006). It is clear that mobility and accessibility issues underpinned the strategic spatial thinking in The City's 2006 GMS. Furthermore it is evident that urban development interventions were understood to be central to addressing these issues. The call for mixed income, mixed use higher density developments resonates strongly with the principles underpinning TOD. It is clear that the transport land use feedback cycle had conceptually permeated the City's thinking implicitly.

The GDS provided the beginnings of a strengthened land use-transport growth emphasis in the City. The 'Corridors of Freedom' vision has its roots in the GDS 2006. It seems that since the introduction of the GMS the City has been grappling with how to achieve these intended spatially compact and inclusive city outcomes. The first real sign of the City's attempt to grapple with how to achieve this growth was the formation of the Growth Management Strategy (GMS) in 2008.

#### 4.2.2 TOWARDS A GROWTH MANAGEMENT APPROACH: HOW THE CITY AIMED TO OPERATE WITHIN THE UDB AND RESTRUCTURE THE CITY

The GMS 2008, was formulated by the planning department. It followed the same principles that informed the GDS 2006 and therefore used the same development paradigm to analyse and approach the future growth of the city. It is also informed by the Gauteng Spatial Development Framework (GSDF) 2007, and the City of Johannesburg IDP and SDF of 2007/2008. All of these documents resonate with one another and the notion of a non-sprawling, densifying city which is increasingly inclusive and developing around a sound public transport infrastructure was emerging as the prominent thinking about what a desired city form would look like. It was around this time that the city had started to explicitly introduce the TOD concept into strategic thinking<sup>39</sup>.

The GMS 2008 provided the means by which the city intended to achieve this desired spatial form. It was envisioned that having a thorough understanding of the status quo would be an essential starting point. This status quo analysis, driven largely by a Geographical Information Systems (GIS) database, which has been noted as a significant innovation in terms of co-ordinating decision making around municipal investment (Todes, 2012a), would then provide the direction for identifying the key priority areas within the city which required investment. The GMS highlights two key means through which to begin achieving the desired spatial form. Firstly, through infrastructure provision and secondly, by using a set of growth management tools which it refers to as a 'toolbox for land development incentives' (City of Johannesburg, 2008: 56). These two elements in combination were believed to best position the City to be able to direct development away from 'low priority' areas towards 'high priority' areas. As well as drive the shape and nature of development in the key areas identified according to the principle of settlement restructuring in the GDS.

#### 4.2.3 INFRASTRUCTURE

In terms of infrastructure provision, the GMS has highlighted two major infrastructure categories that the City of Johannesburg believed essential to directing development, namely electricity and public transport. Power capacity has become a major issue in South African cities

<sup>39</sup> I attended a public information session at the city as a first year planning student where the concept was first presented in association with the idea of a Bus Rapid Transit system.

in recent years and the City had identified the need to manage both electricity demand and supply in 2008 when South Africa experienced the first series of power cuts. What the GMS essentially said regarding electricity infrastructure is that the 'peri-urban' or low priority areas beyond the UDB will not receive any upgrading or supply of electricity. However, within the UDB the marginalized areas in the city as well as the key identified development nodes of the city will be focused upon.

However, public transport infrastructure is believed to be the major infrastructure investment that could fundamentally change the settlement patterns of the city. The City therefore identified key nodes and corridors within the city which would be serviced by public transport routes and stations. This was the main idea informing the GDS principle of settlement restructuring. Calling for future growth and development in the city to be directed around public transport alludes to the idea that the demand to live public transport oriented lifestyles will increase. This fundamentally challenged the current development patterns at the time. A set of incentives were introduced as critical elements of the GMS 2008.

#### 4.2.4 GROWTH MANAGEMENT TOOLBOX

The City's planning department acknowledged in the GMS that infrastructure provision alone will not attract the scale of development that will be necessary to enact a wide scale change. Thus, a set of development incentives were proposed which attempted to attract development into high priority areas. They were listed as the following (City of Johannesburg, 2008):

- Special Development Zones (SDZs)
- Density Bonuses
- Fast Tracking of Land Development Applications
- Waiver of Application and Building Plan Fees
- Bulk Contributions Waiver
- Special Rating Districts

The understanding was that these tools would begin to provide developers with financial incentives to attract them to high priority areas within the city. Although, financial incentive tools have been reported as relatively successfully in attracting private sector investment into the inner city generally, a Johannesburg Development Agency (JDA) study illustrates the factors are more complex (Johannesburg Development Agency, 2011) and not necessarily due to the public transport infrastructure proximity. Rather it seems as though the resurgence in inner city investment has occurred in part due to the affordability and relative ease to provide parking on a large scale, often developing multi-story parking lots covering entire blocks to support commercial office buildings.

With regards to public transport, the idea of density bonus schemes became a prominent tool which was believed to influence private developer decision making. The idea behind a density bonus is that if the developers provide a portion of their development for social purposes, such as social housing or a public library then the developer could increase the height and number of stories of his development beyond the existing zoning regulations. Essentially it is an attempt to incentivise private developers to provide mixed income and mixed land use to achieve more socio-spatial transformative objectives.

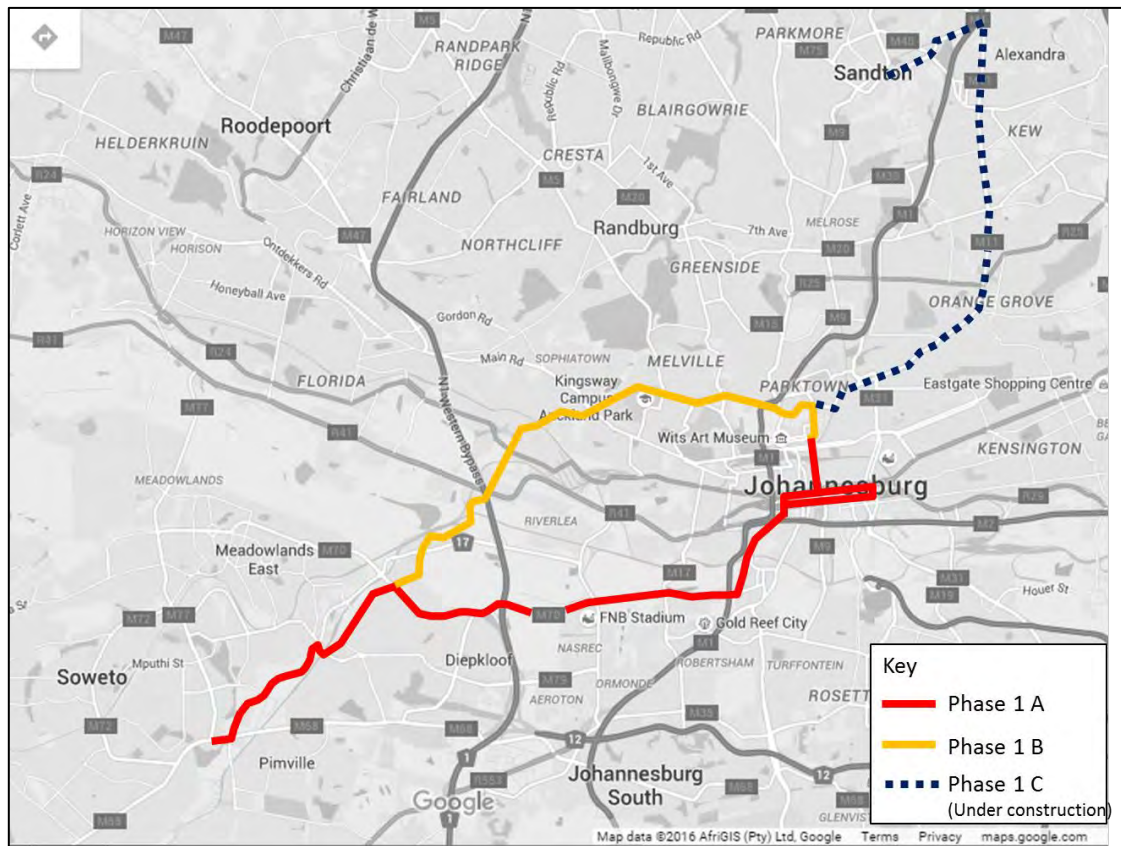
This growth management approach to attempting to steer growth and development in a more sustainable manner has received support and been lauded for innovative approaches to planning in developing world contexts (Todes, 2012a; Todes, 2012b). The coupling and co-ordination of infrastructure development and urban planning policies is arguably critical to more sustainable built environment outcomes. However, the extent to which envisioned outcomes have been achieved is limited and although the GMS provided a much stronger information basis, it has not been able to steer growth effectively across the city at the scale required to enact spatial transformation. Neither have the set of tools, such as density bonus schemes, been implemented effectively and communicated clearly. As a result these were not taken up by the market and this is perhaps indicative of a non-collaborative approach to TOD in the municipality. This arguably highlights the importance of creating a platform for a range of stakeholder perspectives in vision creation and decision making.

### 4.3 THE DEVELOPMENT OF THE BRT NETWORK

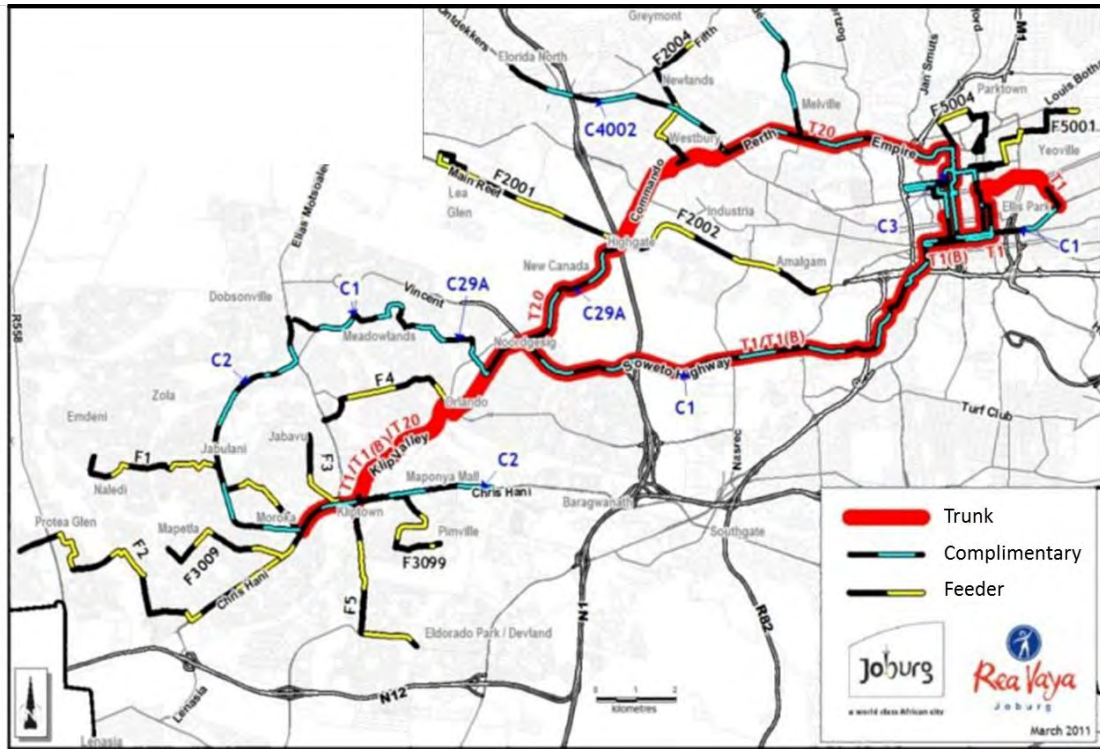
The public transport infrastructural component of the GMS was understood to provide the catalytic impetus for the growth and development of a more sustainable Johannesburg. As the host City of the Fifa World Cup Final in 2010, Johannesburg was under the spotlight to deliver a world class event and showcase itself as a globally competitive city. Public transport upgrades were seen as an integral component of the world cup legacy projects across the country. With a National Public Transport Strategy (2006) developed to drive investment in improvements to public transport infrastructure in 12 selected cities across the country. The strategy essentially called for the development of new public transport services with higher capacities than mini-bus taxis and dedicated right of way to be integrated with existing services and provide an improved overall public transport network. Johannesburg had adopted the South American based BRT model which is sold as an affordable yet competitive alternative to rail-based rapid transit systems.

As has been alluded to previously in the report the route planning and phasing has undergone considerable amendments since project inception. These changes will not be discussed in this report. Figure 3 illustrates the current (existing and under construction) trunk route BRT network. Towards the end of 2009 the City had completed phase 1 A of the project in time for the World Cup. Phase 1 B has recently, in 2013, been completed (see figure 4 for a detailed network map) with phase 1 C currently being implemented (see figure 3) (there do not seem to be accurate and up to date maps of the Rea Vaya BRT network available). The system has underperformed relative to initial passenger number predictions. Part of the difficulty experienced is due to the limited extent to which the system provides access to the city. With only two of the three phases of the first route of the project complete, people who live close enough to access the system might still have to use multiple modes of transport to access various parts of the city. Furthermore, the spatial patterns of the city have remained largely unaltered, making it difficult to extract maximum value out of the investment. Now some 6 years later, there is perhaps support for Suzuki et al's (2013) view that there is a greater appetite to focus investment in transit infrastructure which can yield visible short-medium term results with less emphasis placed on the more complicated and long term objective of transit associated land development. It is perhaps too early to assess whether or not BRT infrastructure has in fact begun to drive spatial transformation across the city. However, given the historical emphasis placed on steering alternative growth patterns and the limited outcomes associated with the

focus one cannot assume that change will simply occur over time as a result of BRT investment as highlighted by Belzer and Autler (2002).



**FIGURE 3: JOHANNESBURG'S BRT TRUNK NETWORK, IMAGE CREATED BY THE AUTHOR. MAP SOURCED FROM GOOGLE MAPS.**



**FIGURE 4: REA VAYA ROUTE MAP PHASE 1 A AND PHASE 1 B, EXTRACTED FROM CITY OF JOHANNESBURG STRATEGIC INTEGRATED TRANSPORT PLAN FRAMEWORK DRAFT (2013)**

#### 4.4 THE GROWTH AND DEVELOPMENT STRATEGY 2040

In 2011 the City released its second GDS (City of Johannesburg, 2011). With a long term horizon of 30 years to 2040, the strategy highlights the fact that although the city has made attempts to enact spatial change and begun the roll out of the BRT network the majority of residents remain burdened by largely unchanged spatial patterns. For the majority of people living in the city this translates into poor levels of mobility and accessibility which persist. The GDS 2040 strategy reaffirms the strategic commitment of the city to transform the space economy. Restructuring the city along compact and inclusive lines, which support and enable the use of improved public transport systems remains a priority. It is clear that there are clear links between the GDS 2040 and the NDP in relation to spatial planning interventions which need to focus compact and inclusive development around public transport infrastructure. The 'Corridors of Freedom' vision is a more focused approach to begin to achieve these objectives, having experienced limited successful outcomes with a broader city wide approach. The next section will begin to unpack the approach to developing the 'Corridors of Freedom'.

#### 4.5 'CORRIDORS OF FREEDOM': THE CULMINATION OF IMPROVED PUBLIC TRANSPORT OUTCOMES AND A RE-EMPHASISED TOD FOCUS

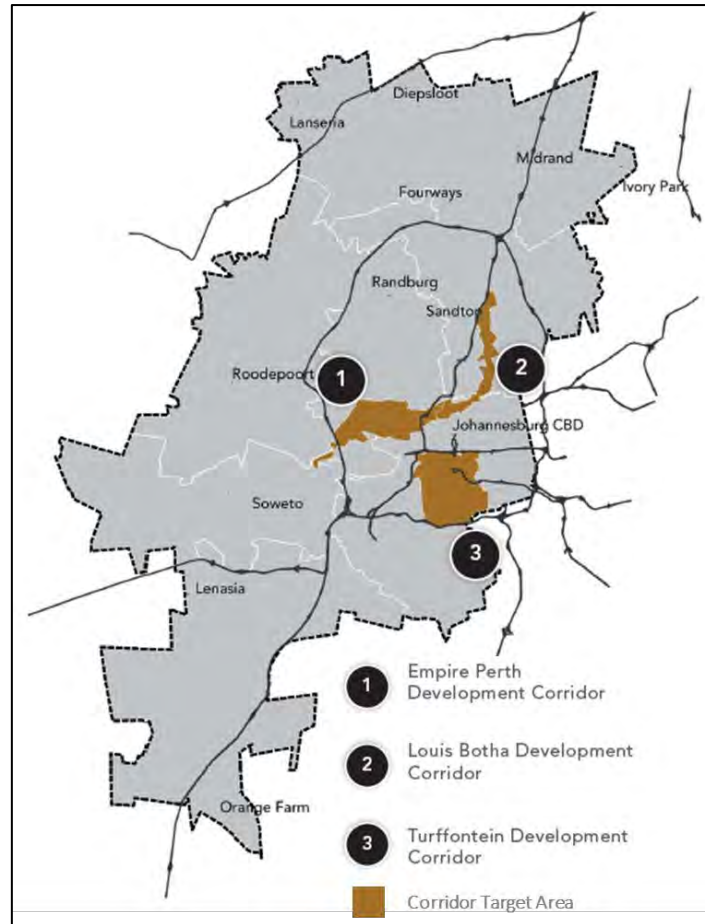
The Corridors of Freedom arguably present the most focused and detailed TOD drive in democratic South Africa. It locates what is a long standing planning department emphasis more prominently across the cities broader strategic goals and budgeting process. In this way it represents a refocused, re-emphasised effort to continue driving TOD type development across the city. It allows significant insight into how the City of Johannesburg has understood the TOD

concept in a South African context and the extent to which they have drawn on international experience and lessons to inform their understanding.

The 'Corridors of Freedom' initiative has solicited much support from the urban development community as perhaps one of the most significant efforts to transform the socio-spatial landscapes of South African cities but many questions remain. Perhaps best captured by Pieterse (2014) when he states:

There can be little doubt that the Corridors of Freedom initiative of Joburg is one of the most important and thoughtful public interventions to systematically transform the spatial dynamics and trajectories of South African cities. It is based on a suite of long-term diagnostic and forecasting instruments that contributes to more astute planning and urban management. Specifically, it is able to cohere diverse sectoral investments and agglomerate them in specific territories that could induce new spatial path-dependencies for the city. This makes Joburg one of the most significant test beds for experimenting with a new generation of governance technologies on the African continent. However, it is too soon to speculate about its societal traction and popular appeal. Regrettably, long-term imperatives such as spatial transformation are difficult to evoke and those who advocate for short-term gratification will always find an outlet in our sound-bite era.

The corridors selected as the initial target areas were selected based on medium to long term developmental thinking. They are relatively centrally focused in the city and are the Louis Botha Corridor, Empire-Perth Corridor and the Turffontein corridor (see figure 5). The nature of the corridors will not be discussed but rather engagement with what has emerged around the strategic thinking for developing these transit oriented corridors to date will ensue. It is envisioned that this will pose a series of questions around the 'Corridors of Freedom' vision relative to the broader discussions which this dissertation has presented.



**FIGURE 5: CORRIDORS OF FREEDOM MAP, EXTRACTED FROM EMPIRE PERTH DEVELOPMENT CORRIDOR STRATEGIC AREA FRAMEWORK**

[HTTP://WWW.CIDFORUM.CO.ZA/FILES/EMPIRE PERTH SAF FINAL DRAFT.PDF.](http://www.cidforum.co.za/files/EMPIRE_PERTH_SAF_FINAL_DRAFT.PDF)

#### 4.5.1 UNPACKING THE 'CORRIDORS OF FREEDOM' VISION

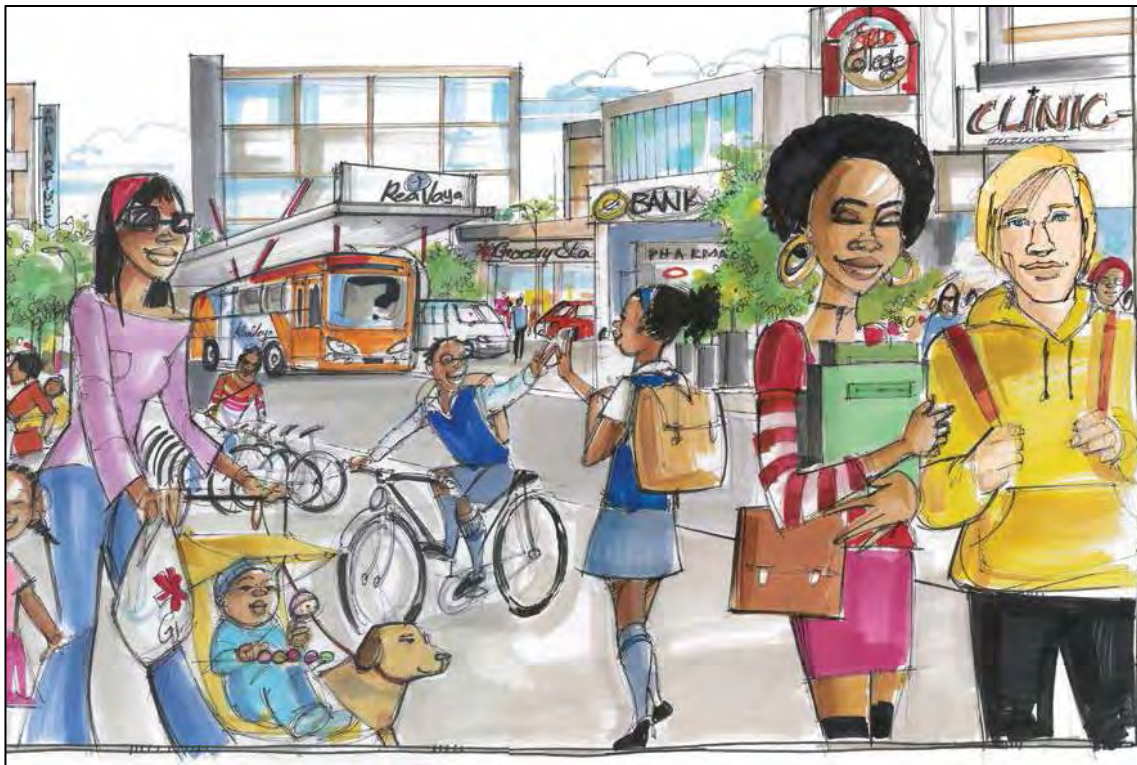
The 'Corridors of Freedom' vision was introduced during the Mayor's State of the City Address in 2013. The address outlines a number of 'fundamental rights' which the city will strive to provide. According to Tau (2013:5) these include:

- The Right to Developmental Service Delivery- where the city maintains and improves existing infrastructure, while expanding new infrastructure. Where citizens have the right to hold us accountable and become active participants in the delivery of services.
- The Right to a spatially integrated and a united City- in which we rebuild and reconnect the divisions created by decades of Apartheid spatial planning.
- The Right to a Liveable city – where all people have access to good quality of life, clean air, food, safety and cultural expression.
- The right to inclusive economic growth- to ensure that citizens are active participants in creating their own economic opportunities and shaping their destiny.
- The Right to remake ourselves in this city- based on our understanding that the citizens of Johannesburg engage not only on the basis of their needs but also on the basis of their capabilities

The 'Corridors of Freedom' vision has been conceptualised to provide for the 'Right to a spatially integrated and a united City'. A brochure explaining the strategy states that:

'We are re-stitching our City to create a different future for our residents where we can link jobs to people and people to jobs. We will be embarking on Transit-oriented Development. Because the developments are along transport corridors, the provision of transport like Rea Vaya will enable fast, safe and affordable mobility along the corridors.' (City of Johannesburg, n.d: 1)

A set of imagery was produced as a result of the vision rhetoric to arguably drive communications around what the city was referring to. The extent to which this is a collective stakeholder vision is unclear but the imagery certainly conveys a message of a fundamentally different living experience for people (refer to figure 6). The "Corridors of Freedom" is arguably the culmination of a more focused city growth and development based explicitly on the concept of TOD. The "Corridors of Freedom" has targeted specific corridor locations along the BRT trunk routes in the city. It is envisioned that these strategic sites will provide the initial steps towards realising the City's broader Growth Management Strategy. The logic is promising and the targeted area approach could be argued to be a useful way in which to focus energy towards integrated implementation approaches required to achieve a different way of city building. As has been stated previously the approach to focusing TOD along entire corridors is perhaps over ambitious relative to Suzuki et al's (2013) indication that due to the Complexity if driving a TOD agenda it is best to select a few strategic stations along a transport network to ensure efforts are focused and outcomes reached effectively showcase TOD. Furthermore, it was argued that while the TOD plan does not necessarily have to be regional it should have regional development implications. By this I mean that TOD cannot simply be an isolated pilot project approach, it must have implications for how development decisions are made throughout a municipal region. Perhaps refocusing the growth management 'tool-box' is one way to achieve this?



**FIGURE 6: CORRIDORS OF FREEDOM IMAGERY SOURCE: CITY OF JOHANNESBURG (N.D) VISIONING DOCUMENT**

The reliance on TOD to achieve wide socio-spatial transformation is quite alarming given the literature outlining the limitations of the concept and difficulties experienced in delivering effective outcomes internationally. Compounding this is the fact that TOD was originally conceptualised as a tool to combat the negative effectives of the private vehicle in contexts where the main mode of transport is the automobile. South African city contexts present vastly different challenges to those faced in developed world auto-oriented cities. While combating the rapid uptake and provision for the private vehicle is part of the challenge faced in South Africa (City of Johannesburg, 2013), conceptually an urban growth strategy will require a more rigorous understanding of the contextual realities and how well traditional TOD is placed to address South Africa's spatial challenges. A series of planning documents have followed the announcement of the 'Corridors of Freedom' vision and IDP. It will be useful to assess the extent to which these have begun to grapple with the detail and lessons exhibited in international lessons.

#### 4.5.2 THE DETAIL OF THE STRATEGIC AREA FRAMEWORK

As is indicated by the narrative in the SAFs it is clear that they have been understood as the spatial plan which will inform decision making around TOD.

'The Strategic Area Framework provides the basic (spatial) mechanism for planning and implementation of the Corridors of Freedom. The documents outlines the desired spatial response to the intent of the Corridors of Freedom vision, and the projects and programs required to realise this spatial vision. In short, the Strategic Area Framework:

- Provides spatial context for future development
- Guides investment decisions
- Identifies requirements and opportunities for transformation.' (City of Johannesburg, 2014: 16)

There is no indication in these 'spatial mechanisms' that the lessons provided from international experience have been considered in the attempt to drive TOD planning. Furthermore the importance of individual station contexts has arguably been underplayed by the emphasis on corridors which does not provide the level of detailed engagement required to understand the surrounding station contexts. The SAFs (as the only TOD based spatial mechanisms) do little to indicate their implications for areas outside of the corridors. This is especially concerning for other areas in the city which contain public transport infrastructure and services.

The Corridors of Freedom represent a significant key opportunity to address and successfully implement the developmental goals of the city as outlined in the 2012/2016 COJ IDP. The approach therefore recognises the potential of the development corridors to:

- Assist in restructuring (spatially and economically) the apartheid city toward a more integrated city form, which seeks to make the city more accessible to disadvantaged groups;
- Encourage more efficient relationships between low income housing, informal economies and public transport;
- Curtail urban sprawl, promote densification and infill-development in order to overcome the burden of fragmentation of urban areas;
- Promote efficient implementation and use of public transport;
- Promote accessibility to economic and social opportunities;
- Support efficient service provision;

- While these bullets provide a much greater sense of the potential of TOD (many of which are underpinned by the land development dynamics accentuated in international literature) the SAFs do not go further to unpack the detail of what each of these areas will mean for various stakeholders. This detail is essential in building a wider consensus and communicating the role which various stakeholders will play both within the municipality but also outside of the municipality.

‘On average, the population in the three corridors will increase from 7 436 people per square kilometre to 41 632 people per square kilometre. High density residential developments within the corridors need to support a range of typologies, densities and incomes. In order to realise the envisioned social inclusivity within the corridors, the City has to invest in acquiring land for affordable housing. (City of Johannesburg, 2014: 109).

The call to acquire land is also interesting and not something which is found prominently in international literature, where the emphasis is more on the transit operator and private developers to drive land development. While the state arguably does play a more prominent role in land development in South Africa, there is perhaps a critical reflection required as to the extent to which South African municipalities are well placed to drive TOD on their land holdings.

Perhaps the focus should be centred on land use planning and development controls and applications processes, as advocated by Greenberg (2004)?

#### 4.5.3 EVIDENT GAPS AND LIMITATIONS TO THE CURRENT UNDERSTANDING

The analysis highlights that the City has identified the high level principles of a TOD strategy and attempted to expand the detail of what these might mean in the development of SAFs. However, this does little to give insight around the approach required to achieve outcomes and there has been limited substantive documentation which has been developed outlining the 'Corridors of Freedom' strategy. Along with the release of the visioning document the Strategic Area Frameworks provide the only other formal documentation concerning the corridors. As explained by the City of Johannesburg (2014: 14) these documents have been interpreted as the key documents driving TOD thinking and implementation in Johannesburg. Strategic Area development frameworks have been developed by consulting firms and uploaded to the City's website. The area frameworks provide a section titled 'The Corridors of Freedom & Transit Oriented Development' which arguably provides a relatively clear understanding of how Johannesburg Metropolitan Municipality has interpreted the TOD concept in the city's context. Perhaps unsurprisingly the understanding provided predominantly covers the limited physical aspects outlined in Chapter Two. There is also a noticeable emphasis on the importance of accommodating a mix of income groups as indicated by the 'broad outcomes of the Strategic Area Framework' (City of Johannesburg, 2014: 16). Highlighting the socio-spatial transformative understanding and the inclusion of a limited view of TOD, the framework states,

'This Strategic Area Framework (SAF) is a direct attempt from the City of Johannesburg (CoJ) to not only address the fragmented spatial form of the City, but also to ensure that the economic benefits of the future envisaged city and shared inclusively by all residents. While numerous attempts have been made to redress the physical legacy of apartheid planning in the city, the urban landscape is still dominated by sprawling low-density settlements. The harsh reality is that the majority of working class and poor citizens are physically far removed from employment and other economic opportunities situated in or around the urban core. This often results in the poorest of the poor having to commute long distances, often at high cost, in order to reach places of employment.

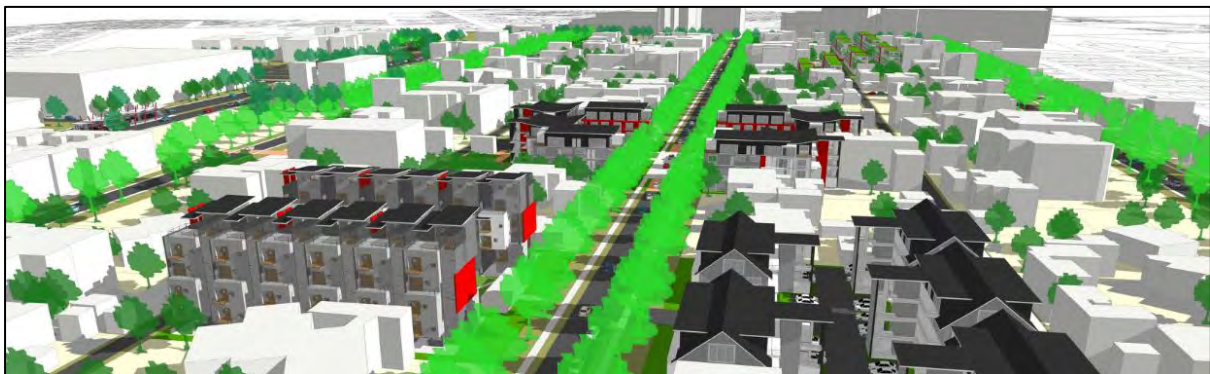
In order to change this, and the lives of all citizens, the City of Johannesburg introduced its new spatial vision based on TOD, where urban spaces with a vibrant mix of high density developments, accommodation options, office, retail and recreational spaces will be connected by well-planned public transport arterials. The optimal mix of economic, education, transport and recreational opportunities will ultimately give rise to a people-centred City of Johannesburg, where the needs of all citizens are placed at the core of all planning processes.' (City of Johannesburg, 2013a: 6)

In this regard it is evident that the 'Corridors of Freedom' vision resonates strongly with identified principles of compaction and inclusion underpinning the urban strategies of the City as well as the NDP. This statement provides a clear and explicit understanding that TOD is understood to be the tool which can address the adverse socio-spatial context in Johannesburg. The underlying features of the 'Corridors of Freedom' resonate well with the spatial factors many TOD definitions contain, as well as the introduction of the mixed income factor. Highlighted by the area framework which list the 'key features of the 'Corridors of Freedom'. These include:

- Safe neighbourhoods designed for cycling and walking with sufficient facilities and attractive street conditions;
- Safe complete streets with features to calm traffic, control vehicle traffic speeds and discourage the use of private transport;
- Mixed-use developments where residential areas, office parks, shops, schools and other public services are close together, stimulating economic activity and creating opportunities for emerging entrepreneurs;
- Rich and poor, black and white living side by side – housing options providing a range of types and prices including rental accommodation;
- Convenient transit stops and stations (City of Johannesburg, n.d: 6)

While this is argued to provide a useful indication on the broad nature of TOD envisioned it once again highlights a poor appreciation for the importance of detail provided in the international literature. Furthermore it underplays the immense challenges faces internationally but also locally in driving mixed income housing environments.

Following these factors a critical statement is made which indicates that ‘there will be a clean break with apartheid spatial distribution and people living on the periphery will be able to move closer to economic opportunities’ (City of Johannesburg, 2013a: 6). This is argued to provide the justification for an explicit and communicated emphasis on the specific shifts in the institutional, political and stakeholder dynamics which the city will arguably need to grapple with intensely in order to ensure effective TOD outcomes occur. However, such detail and strategy are not evident throughout the document nor does it indicate that there will be further strategies required to realise the physical objectives.



**FIGURE 7: PERTH EMPIRE CORRIDOR RENDERING, SOURCE CITY OF JOHANNESBURG (2013A)**

Mentioning ‘different typologies’ or ‘density’ from a design perspective and providing renderings in this regard (see figure 7) is useful but does little to unpack and engage with the multiple stakeholder dynamics around decision making. There is no indication of what the target densities for the corridors are based on, how they were arrived at and how this might relate to transit ridership. There is no indication of what the target balance is between private car use and allowance in the corridor. The study done by Marks and Wilkinson (2007) would have proven useful to apply in the corridor setting to assess at which income brackets people enter vehicle ownership status as a comparison of the National Household Travel Survey (NHTS) 2003 and 2013 illustrates that car usage has increased substantially over the past decade. Targeting such an income group would perhaps be useful from a strategic perspective, it will allow a detailed market analysis to be conducted on the feasible densities and uses

developments can accommodate. Furthermore the lack of a differentiated framework approach does not guide which densities would be appropriate around which station areas.

Figure 8 is interesting in that it provides a rendering of a non-corridor of freedom area. It depicts the land development vision developed for the BRT system running through Soweto (interestingly it is located in the Corridors of Freedom visioning document). It reflects a fairly homogenous formal TOD response in an area which presents a set of complex land ownership and development dynamics, with high levels of informality. Furthermore it does not indicate what additional activities and uses would be encouraged or facilitated around stations to develop a vibrant and functional mixed use environment. An indication of who can provide such development and how it could occur is also critical in developing awareness about other stakeholders' roles and providing a clear framework for other important stakeholders to contribute to the TOD growth agenda.



**FIGURE 8: ORLAND, SOWETO BRT CORRIDOR RENDERING SOURCE: CITY OF JOHANNESBURG (N.D) CORRIDORS OF FREEDOM**

While the SAF is acknowledged as a spatial tool and should rightly focus on spatial frameworks and not the land development dynamic issues there do seem to be large amounts of uncertainty surrounding the enabling factors which have either driven or crippled similar developmental

approaches in other contexts. While some argue that this is being thought about in the city in internal meetings (indicated in the stakeholder interviews), I argue that such issues need to be developed in collaboration with other important stakeholders. Currently it does seem that the City government is trying to 'go it alone' by building the transit and other infrastructure, owning land and developing housing and property along the corridor. Drawing on the understanding that no single entity can implement TOD alone, this is a major concern.

I argue that the City needs to strongly consider producing a publicly available strategy, developed in collaboration with other stakeholders, which outlines the collective intent regarding funding, institutional arrangements and processes for the development of the Corridors of Freedom. The inability to engage, negotiate and collaborate effectively with other stakeholders will arguably impact on the implementation of the strategy.

It seems that while conceptually TOD has been adapted to suit the South African or Johannesburg context as advocated for by Wilkinson (2006) from a rhetoric perspective in that it is understood as a tool for socio-spatial transformation, the details surrounding such a TOD agenda have not been adequately researched and worked through, rather generic physical principles have been drawn on and included in SAFs. These SAFs have been driven by consulting processes as opposed to collaborative municipal multiple stakeholder engagement. This directly limits the ability of the process to be more detailed and thorough in engagements as consulting teams are under time pressure to complete the job. The most effective role of consultants in municipal planning is one of the critical areas which will need to be considered moving forward.

This section has highlighted that TOD principles have underpinned the Johannesburg strategic growth agenda for the past decade, to date little has come from the growth management and planning incentive efforts. The City has taken a bold step towards prioritising TOD in the IDP and medium term budgets. And looks set to become more active in housing development along the identified corridors. Understandings of TOD as expressed in key documents remain largely limited to non-detailed generic internationally adopted physical principles. The slow progress is perhaps then unsurprising when assessed relative to international experience.

Somewhat alarmingly, there is no real focus on the opportunities which exist for the integration of land use and transport in Soweto, which has received major investment in BRT with services operational since 2009. Reflecting on the examples of Medellin there are arguably exciting possibilities which exist for innovative land use transport integration by investing in high quality social facilities. While it is evident that significant investment has taken place in Soweto over the past decade, the extent to which this has been deliberately transit (Rail, BRT and taxi) oriented is unclear and is clearly not reflected in the cities explicit TOD strategic thinking.

#### 4.6 STAKEHOLDER ANALYSIS<sup>40</sup>

Drawing on the understanding that it is in fact the energies, ideas and investment strategies of multiple sets of stakeholders which realise TOD outcomes I believe that one needs to move beyond the understandings depicted in policy documents and plans developed by a department in the municipality. Thus a stakeholder analysis has been conducted to assess the extent to which various potentially TOD influential stakeholders understand the concept in Johannesburg.

The dissertation has arguably highlighted that the multiple stakeholder nature seems to be the major cross cutting element which underpins detailed physical characterises but also informs the divergent and contradictory nature of land development dynamics. In this regard it perhaps represents the most strategic area to target for strengthening vision building, detailed planning and feasible implementation.

According to the World Bank (n.d) 'Stakeholder Analysis (SA) is a methodology used to facilitate institutional and policy reform processes by accounting for and often incorporating the needs of those who have a 'stake' or an interest in the reforms under consideration'. This provides an apt description for the stakeholder analysis conducted as part of this research as the interests and understandings of the TOD concept of a range of influential and important stakeholders provides broader insight into how TOD is being understood in South Africa and in Johannesburg more specifically. In this regard the stakeholder analysis is viewed as an important supplement in answering the research question. .

##### 4.6.1 METHOD

The starting point for the stakeholder analysis was the identification of a range of stakeholders which would potentially be involved in TOD in a South African context. The research arrived at a set of possible stakeholders by drawing on existing literature (Belzer et al, 2004) around TOD stakeholders and intuitively thinking through built environment stakeholders in South African development and what their broad respective interests might be. This was achieved by asking '*Who invests in property development in the built environment and why?*'.

Intuitively the following broad categories were identified:

- Public sector invests to provide housing opportunities, social services, government offices generally to maximise social welfare
- Private sector invests in housing, office and retail for financial return on investment
- Private individuals invest in upgrading living environments- informal or formal

Table 1 captures this in more detail.

Table 1 captures this in more detail.

**TABLE 1: OUTLINE OF TOD STAKEHOLDERS**

| Stakeholder                                               | What investment                                        | Objectives                                                                                                                                                                   | Possible TOD role                                                                                                                                                            |
|-----------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a. Ἰνστιτούτο Πολεοδομίας                                 | Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ἰσχυρό              | <ul style="list-style-type: none"> <li>- τοῦ ἰσχυροῦ ἰσχυροῦ ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul>                | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> |
| b. ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ | Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul>                                                                   |
| Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ    | Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul>                                                                   |
| Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ    | Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> |
| Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ    | Ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> | <ul style="list-style-type: none"> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> <li>- ἡ ἡμετέρα πόλη ἔχει ἡμετέρο ἰσχυρό ὁ ἰσχυροῦ ὁ ἰσχυροῦ</li> </ul> |

Of the set of possible stakeholders that were identified only municipality staff, developers and financiers, and transit agencies were targeted and interviewed (refer to Annexure A for interview letter and structured, open ended interview questions). This was largely to ensure focus on the local dynamics specific to the City of Johannesburg and to ensure a manageable research process. It is however acknowledged that the views of communities and National and Provincial government stakeholders are critical to understand. As has been mentioned in the method section of the dissertation, identifying individuals which adequately represent the range of stakeholders identified was challenging. Interview request letters were sent to 15 people. The research wishes to keep the individuals interviewed anonymous. It is argued that responses documented in the research are reflective of the department or organisation and not of the individual. Furthermore there is no benefit which is believed to be derived from disclosing individual identities.

Amongst the fifteen targeted stakeholders were municipal representatives from different departments and agencies; PRASA representatives, another key mass transit agency operating in the city; private developers operating at a variety of scales; financiers involved in affordable housing and large commercial banks. Table 2 outlines the list of targeted representatives.

A letter of request for an interview was sent to each of the stakeholders listed in table 2. The letter included the set of interview questions to ensure that the stakeholders had an idea of the research intent. Of the fifteen requests which were sent thirteen people responded. Two people were unable to meet for the interview. One person indicated that he would be able to best respond via email and the remaining 10 I was able to meet for an interview.

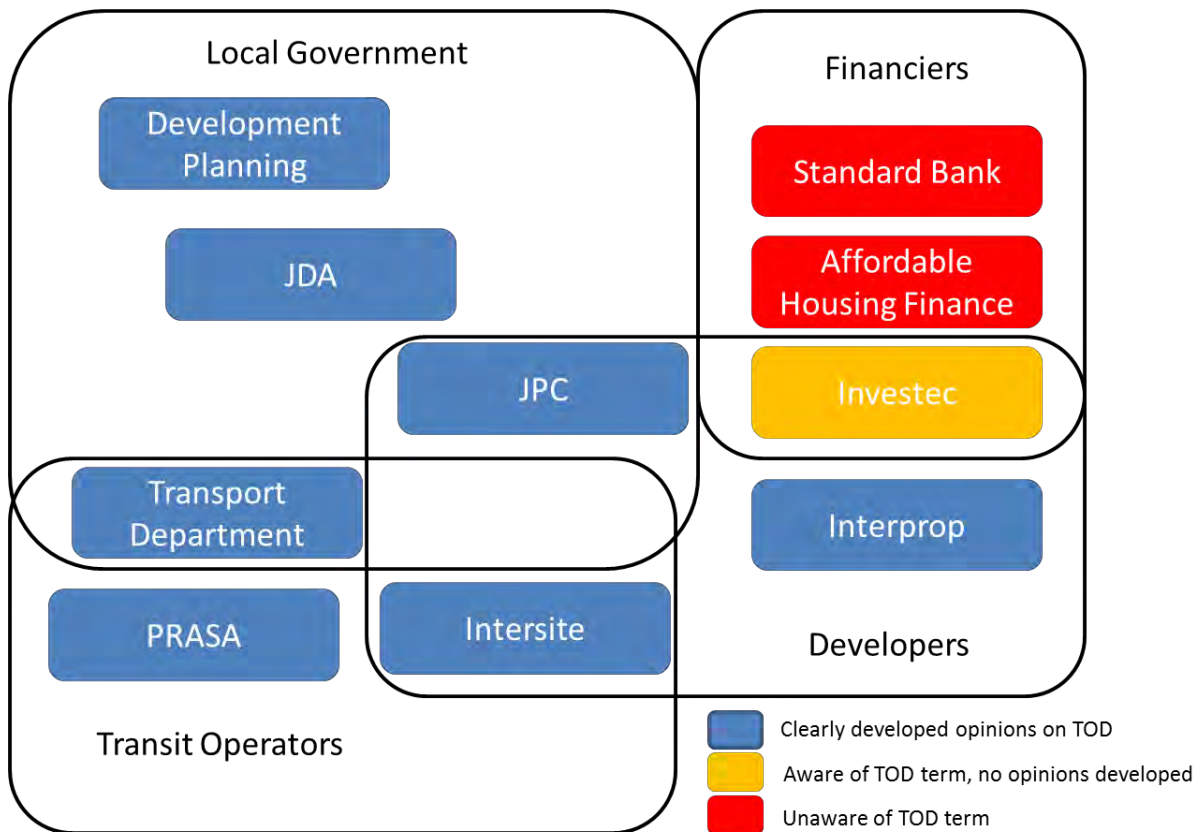


|                                                           |                                                                |                                                                                                                  |                                                                                                 |
|-----------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| t o n f t u s<br>t o u m s o u b l<br>s s f s p u m s o o | L o f s s u s o                                                | ! p f / u o o u p p s o o n f p m o u m s o u b l<br>s s f s p u m s o n n w u ' l f n n s o o h o °             | t u s n n f s n n n s o f n s x<br>o u n s n o u s s                                            |
|                                                           | L o u s o n n u s                                              | ! p f / u o o u p p s o o n f p m o u m s o u b l<br>s s f s p u m s o n n w u ' l f n n s o o h o °             | t u s n n f s n n n s o f n s x<br>o u n s n o u s s                                            |
|                                                           | I p f f y f p n f n s n                                        | ! s p f p p s o o f f p s o s n s s n n f p m o u m s o u b l<br>s s f s p u m s o n n w u ' l f n n s o o h o ° | b u o s s m u n s s                                                                             |
| C n f n o n s o o                                         | L o f s s u s o                                                | ! o u p p s o o n f p o f n n n ° m o u m s o u b l<br>u n n f n o n s o                                         | t u s n n f s n n n s o f n s x<br>o u n s n o u s s                                            |
|                                                           | { u f n s f o s . f n n                                        | ! o u p p s o o n f p o f n n n ° m o u m s o u b l<br>u n n f n o n s o                                         | t u s n n f s n n n s o f n s x<br>o u n s n o u s s                                            |
|                                                           | b s s o f n n m o u m s o u b l                                | ! o u p p s o o n f p o f n n n ° m o u m s o u b l<br>u n n f n o n s o                                         | b u o s s m u n s s                                                                             |
|                                                           | b s s o f n n f u u o n s f o p s<br>' u n n n ° u n n f n o s | ! n f u u o n s f o p s ' u n n n ° u n n f n o n s o                                                            | s n f o p s u u p s s u n n<br>u n n o u ' s o o s s m u n s s                                  |
|                                                           | w c { ' u n n n °                                              | ! n f u u o n s f o p s ' u n n n ° u n n f n o n s o                                                            | s n f o p s u u p s s u<br>n n s o f u s s u ' l f u ' l f s<br>n s f s o ' l s f o s u u e h 5 |

For those respondents who were interviewed the interviews were semi-structured. The conversation was led by the series of questions provided in the letter. However, the discussions took different directions. The majority of respondents responded to follow up emails after the interviews for points of clarity and expansion on some answers to questions. The interviews were then synthesised and captured in a table (see annexure C).

#### 4.6.2 INTERVIEW ANALYSIS

This section will provide an analysis of the interviews conducted. It seeks to provide insight around the TOD understandings which various representatives presented. Figure 9 illustrates the extent to which various stakeholders interviewed were generally aware of the TOD concept prior to the interview taking place. This is useful in that it provides a sense of how well the concept has permeated into the thoughts of stakeholder groups. Furthermore it is important as it guided the manner in which the interview was conducted. Those stakeholders who had greater awareness could discuss some of the detail surrounding their approach to TOD while those who had limited understandings required a more introductory discussion.



**FIGURE 9: STAKEHOLDER MAPPING, SOURCE: DEVELOPED BY THE AUTHOR**

The interview analysis will be structured according to each of the broad questions posed to respondents. The results of the interview were captured and synthesised in a table (refer to Annexure C).

#### 4.6.2.1 What does TOD mean in a South African context?

From the interviews it is clear that understandings around what TOD was in a South African context were varied. Public sector respondents had all formed ideas of what it was that TOD could achieve. In the instances where urban planners represented stakeholders in the private sector there was a far greater awareness of the TOD concept. Outside of this there was a general lack of awareness of the TOD concept. While it is not surprising that private sector stakeholders are unaware of an urban planning term and concept, it is nonetheless concerning. If achieving effective TOD does hinge, in part, on the ability of multiple actors to work together then it is argued that much work is required to facilitate dialog between the municipality and other public the private sector stakeholders. It must be noted that besides for municipal respondents, the answering of this question was not immediate and all other respondents were interested to hear what definition I was using for TOD before answering the question. However I was careful not to influence responses and indicated that there is no set definition and the research is working towards building a better understanding which incorporates a range of stakeholder views. The research was of course assessing the extent to which stakeholders were aware of the concepts and had formulated an understanding as to what it meant.

The views on what TOD means in a South African context can be broadly grouped into the municipality's respondents views where besides the respondent from the Johannesburg

Property Company (JPC) there was a relatively consistent understanding that TOD represented a strategic tool to achieve socio-spatial restructuring in the city. Highlighted by phrases such as 'restricting the city back together'<sup>41</sup>, 'breaking down the spatial divide'<sup>42</sup> and 'a tool to achieve spatial transformation'<sup>43</sup>. Furthermore, and in line with North American conceptualisation, there seemed to be an understanding that TOD had the ability to reduce private vehicle dependence. Both respondents from the Transport Department and the Development Planning Department respondent highlighted this point. This was the understanding portrayed by the JPC representative who believed that TOD presented the possibility to reduce parking requirements in developments which would 'change the entire development equation'<sup>44</sup>.

I argue that this highlights that the City has perhaps understood the dualistic nature of South African cities as presented by Wilkinson (2006) and has interpreted TOD as a tool which can both reduce private vehicle dependency and also deliver more compact and socially inclusive urban growth.

The PRASA respondent had a somewhat different interpretation. With pressure facing the national fiscus due to a reduction in economic growth and PRASA's inter-city rail services operating subsidies growing and are in excess of one billion rand annually (DBSA, 2012), the rail operator is under pressure to reduce the annual subsidy it requires. In an attempt to achieve greater reliance on own revenues, strategies to capture greater market share by improving the service (which requires further state investment) and leveraging revenue from existing land ownership have been pursued. The TOD discussion at PRASA is centred around the latter. This brief background is important to outline as it establishes the perspective underpinning the PRASA representative's response to this question.

It is clear that PRASA do not understand TOD in the same light as the City. Both representatives from PRASA highlighted that TOD is a tool which can achieve greater revenue generation for the transit operator. There is inherently less emphasis being placed on socio-spatial restructuring or a reduction in vehicle use. The primary focus is economical, achieving development which will yield the highest returns. Belzer et al (2004) outline this point as one of the most notable conflicting interest points which a transit operator brings to the table in a TOD agenda. The other is arguably in evidence around many Gautrain stations where in order to facilitate greater catchment the primary land use for land owned by the operator is parking.

The private sector responses to this question were limited. Investec properties and Intaprop representatives were both urban planners and were familiar with the TOD term. Their understandings of what it meant in a South African context varied. Investec respondents indicated that it represented a potentially exciting opportunity to reduce parking requirements in developments which would reduce costs for developers significantly. However, there was a real concern that public transport services are not effective enough to ensure tenants of properties were willing to lease properties with less parking provision, regardless of proximity to stations. The density allowances were seen to be favourable. This understanding arguably lends itself to the TAD related outcomes.

<sup>41</sup> Interview with respondent from the City of Johannesburg Development Planning Department.

<sup>42</sup> Interview with respondent from the City of Johannesburg Transport Department

<sup>43</sup> Interview with representative from the Johannesburg Development Agency

<sup>44</sup> Interview with representative from the Johannesburg Property Company

Intaprop is a 'precinct developer'<sup>45</sup> which focuses on packaging development opportunities at a precinct scale to shape city growth. Its development model is thus of a different nature and a larger scale to a single site developer. It requires longer term thinking with complex processes around land assembly, infrastructure investment and development approvals. According to the respondent TOD represented an opportunity to cater for a new market and redevelop existing suburban areas. This would require significant shifts in the manner in which current development occurs. The financiers engaged in this research displayed a lack of awareness and understanding of TOD and the City's corridors of freedom strategy.

In line with international experience a variety of understandings of TOD were uncovered from stakeholders. From these high level introductory understandings it is evident that conflicting interests exist. While the municipality clearly sees TOD as a social and spatial transformation tool which carries with it ideas of social inclusion and affordability. Other stakeholders are focused on maximising financial return, often in property development circles these two issues cannot co-exist be it due to perceived or real obstacles. While it is furthermore evident that developers and financiers have concerned themselves with the concept to a far lesser extent, arguably they see less alignment between their interests and objectives and the TOD concept. The following sections present the outcomes of the questions surrounding some of the detail which might inform TOD in South Africa, the views of the private sector stakeholders are limited in these sections.

#### 4.6.2.2 Which segments of the housing market might begin to be accommodated in a South African TOD agenda?

Views on this point varied significantly across the stakeholders who had formed views on the concept. It seemed that for some respondents this is the first time they had thought about this issue. The JDA representative answered this question by immediately stating that it would be difficult to get to the lower ends of the market due to the 'real costs involved in development along the corridors'<sup>46</sup> (referring to the 'corridors of freedom'). This was a significant remark as it highlighted that there was an awareness of similar challenges faced in international experience. The respondent went further to explain that the city had done much work on affordable housing provision in the inner city (which was argued to be the largest 'transit hub' in the city). However, that it had been criticised for 'not going down far enough'<sup>47</sup>, referring to the inability to supply affordable housing in central locations for lowest income earning portions of the population. I enquired about the possibility to incorporate the vast housing subsidy into a TOD agenda to address this issue. The respondent indicated that the JDA were now being tasked with implementing housing along the corridors and there is real pressure to deliver outcomes which realistically does not leave enough time to collaborate with national or provincial government. This point possibly alludes to the impact of short term political cycles on long-term outcomes and objectives. From the South African policy literature it seems that in theory there is a real opportunity to co-ordinate efforts in housing development of the three spheres of government to target a wider range of the housing market in a TOD agenda. However in practice many challenges surround such an agenda (South African Cities Network, 2014).

<sup>45</sup> Interview with representative from Intaprop

<sup>46</sup> Interview with representative from the JDA

<sup>47</sup> Interview with representative from the JDA

The Transport Department representative also indicated that the city is working towards supplying affordable and gap market housing along the corridors. Concerns were also expressed for the ability of lower income groups to be accommodated in wealthier areas and Sandton was provided as an example. This is where the role of transport improvements were argued to be important as they could provide improved access from marginalised areas where land is more affordable to core economic areas. The Transport Department representative explained that the role of the private sector along the corridors was less clear. I brought up the important role identified in reducing private vehicle use in the city and enquired as to whether that informed the particular market which a TOD agenda could target. The response was that people largely remain reluctant to give up private vehicles, which is why the role of private sector developers was questionable. No links were drawn with a particular housing segment and new vehicle users, as was done by Marks and Wilkinson (2007).

The Development Planning Department representative explained that the corridors presented an important opportunity to develop affordable housing options. It was believed that this was an essential part of being able to achieve TOD objectives. In a slightly different manner than other municipal respondents it was argued that a significant challenge for the city will be to ensure that gentrification (and associated displacement or replacement) does not take place along the corridors. The belief that private sector developers will eventually see large value in TOD and direct investment along the corridors was only similarly expressed from the JDA respondent. This resonates with international challenges experienced attempting in ensuring that a diversity of income groups are catered for in TOD developments.

The JPC representative argued that the BRT service was not catering for the poorer segments of the housing market. Perhaps inferring that it would not make much sense to cluster housing targeted at the lower end of the market around BRT services. I think this is a limited approach to making the argument for why lower income affordable housing will be difficult to accommodate as walking and cycling from these locations would be more viable transport modes for poorer households from within the corridors. Also these households are likely to move to using the public transport service should their income levels increase especially if fare subsidies are provided. However, it does raise interesting points around the link between fare-box revenue of transit systems and surrounding development. With increasing pressure being placed on cities to recover operating costs of BRT systems the particular market segment targeted in development is important. The JPC representative did argue in this regard that 'a huge market exists in the gap market'<sup>48</sup>, perhaps making connections similar to those of Marks and Wilkinson (2007).

From the cities perspective it is clear that achieving income diversity is an essential element of TOD. This lends support to the earlier presented idea that the mixed income principle is in many respects a non-negotiable point of South African based TOD if it is to achieve effective socio-spatial transformation. However, the interpretation of mixed income and what it means needs to be clarified. There is also some (although limited) clear evidence that there is awareness of the challenges surrounding the inclusion of affordable housing. The understanding of these challenges varies and there exists no real sense that ideas to overcome such challenges are being formulated. Interestingly, the conflict between the socio-spatial restructuring objective of

<sup>48</sup> Interview with representative from the JPC

TOD and the practical challenges surrounding inclusive development in international experience were not identified in any interviews.

PRASA representatives did not offer much insight around this question. Both respondents referred to the importance of the 'station typology framework'<sup>49</sup> which PRASA have developed to inform the best fit developments for stations. This largely provides a framework for the distinction between commercial and residential development. It was clear that they have not concerned themselves with residential development to date as it is not generally perceived to be the development which yields the greatest financial returns. I attempted to interrogate the idea that residential development had the ability to increase market share by increasing the catchment of stations and in doing so increase fare-box revenue. This was acknowledged but I got the sense that this was the responsibility of the municipality and provincial and national housing departments. Interestingly, the Intersite representative explained that the current model is based on the Hong Kong rail plus property model. However, it is clear that such a model has a major residential component (Cervero and Murakami, 2008).

Besides the representative from Intaprop the private sector stakeholders offered limited responses to this question. Intaprop's respondent argued that in theory they are a range of housing markets which could be targeted for TOD development. These included middle income residents who are seeking a different lifestyle, new affordable housing market entrants and the student housing market. The student housing market is one which has not been grappled with in literature and is arguably important to explore. However the Intaprop representative explained that from the developer's perspective the current location of the City's BRT services does not align to their investment priority areas while the Gautrain system might align more strongly. Arguably highlighting the need to think about how TOD might apply in other areas of the city served by transit.

Not in relation to this question the Standard Bank representative referred to the impact of the Basel III report<sup>50</sup> on the ability of the bank to invest in property, especially affordable residential property, this will be discussed in more detail in the next section.

It is clear that there is somewhat of a mismatch in understandings as to the segment of the housing market which can be targeted when reflecting on all responses. There is a clear need to think through who might begin to be accommodated in a TOD agenda and how this might occur. It does seem that the housing subsidy scheme has a key role to play in financing housing for lowing income earners but how this might occur remains unclear as will be discussed later. The extent to which private sector finance can be leveraged for TOD developments also remains uncertain and will impact on the targeted segments significantly. Much more work is required in this regard.

<sup>49</sup> Interviews with representatives from PRASA

<sup>50</sup> According to KPMG (2011) After the global financial crisis of 2009 the Basel Committee of Banking Supervision proposed a set of global banking reforms to strengthen the regulatory environment, these are detailed in a report known as Basel III.

#### 4.6.2.3 How can the housing subsidy scheme be incorporated into a TOD agenda to ensure that the unequal spatial legacy of South African cities begins to be restructured?

There was a deficient understanding as to the possible role of the housing subsidy scheme. The respondents from the JDA and Development Planning Department indicated that accessing such a funding source to support TOD was challenging as it required significant co-ordination with National and Provincial government. Part of the challenge was that the devolution of the human settlements function to local government is currently being thought through but it was unclear what the outcomes will be. The JPC respondent indicated that the subsidy would need to be dramatically increased to deliver subsidised housing in locations close to transport infrastructure. This reflected on the cost of land and not on the land development complexities and costs which are associated with TOD as reflected in international experience.

The Intersite respondent indicated that it was important for the housing subsidy to be used differently and that there was interest in the development of subsidised and low cost housing on PRASA owned land, but that the transit operator was reluctant to release particular land with high revenue potential for the development of low-cost housing. Perhaps this highlights the tension that exists in attempting to fulfil different objectives.

The Intaprop respondent suggested that the housing subsidy be opened up to the private developer market. In this way funding can be guaranteed to responsible developers looking to drive a shift in city growth in line with policy. The current call by the national department for human settlements for public-private partnerships to deliver 1.5 million housing units over the next five years perhaps alludes to this possibility. Arguably in reference to the Basel III report the respondent argued that the subsidy could be used to de-risk the perceived lack of bankability of housing schemes, this however would require lower returns to be expected. This is perhaps an option which requires further exploration but will require careful controls and considerations due to the profit maximisation interests of the private sector. Such an approach represents an interesting potential suggestion as to how to avail finances for TOD specific development.

The limited insight obtained from these responses perhaps highlights that Wilkinson's (2006) suggestion that it was not inconceivable that the housing subsidy could be channelled into the development of a different property product will require a more detailed engagement. In principle the idea is strong but as it stands it seems that both municipalities and private developers will struggle to access funding as well as influence decision making. In the case of the municipality this does not mean that they could not shape the outcomes of the subsidy scheme through effective implementation of SPLUMA (SACN, 2012), but there are many challenges surrounding this issue which are not covered in the research.

#### 4.6.2.4 What are the greatest barriers to achieving Transit Oriented Development in South African cities?

Challenges identified varied by issue and level of detail, for the most part these were aligned to those reported in international experience but other nuanced issues were also raised. From the JDA respondent's perspective a number of issues were identified, amongst them, planning approval processes, urban management capacity, existing residents objections, poor implementation of housing projects which are seen as make or break rather than a learning

experience, the crowding out of poorer residents along the corridors referred to as the ‘cost of success’<sup>51</sup>. These represented some interesting issues to consider, some of which have not been extensively covered in literature, and these will briefly be discussed.

Urban management capacity was explained to be a concern as the issues of ‘crime and grime’ have become associated with dense environments in South Africa. Ensuring effective management of dense TOD areas is essential to quality of life associated with such development. The concern was that this requires extensive urban management capacity from the municipality which does not exist. Where such services have been outsourced to the private sector this requires the pooled financing of property owners (which might not be possible in affordable housing dominant areas) and furthermore private urban management practices are questionable. This is a useful challenge to reflect on and has not been picked up extensively in international literature but perhaps is captured with the place making and high quality public realm emphasis.

The idea that projects are understood as ‘make or break’ as opposed to learning opportunities is another critical point to note. Bertolini (2012) calls for experimentation and exploration of achieving greater land use transport integration. Should project attempts be viewed as failures there is the risk that TOD programmes will not receive continued support from a political perspective. This is a point which talks to the political challenges faced in driving long term urban spatial pattern transformation. The other points mentioned by this respondent are relatively well aligned to international experience.

The representative from the Transport Department highlighted that developers continue to get ‘a better return from gated communities on the periphery’<sup>52</sup>. This shares strong links to Belzer and Autler’s (2002) understanding that transit is one of many factors which drives development and as such other sites often remain more attractive to developers. The other major challenge centred around the prominent aspirations of driving cars both for existing users who are reluctant to shift to public transport and those who are existing public transport users and aspire to own and drive cars. Importantly, these two identified issues are closely related.

The Development Planning Department respondent’s understanding of the challenges was somewhat different. Funding constraints exist in financing infrastructure requirements to support higher densities in TOD and to provide the things ‘that cities don’t ordinarily spend a lot on, like the creation and activation of great public spaces – destinations’<sup>53</sup>. The latter point is important to acknowledge as authors have argued that the local government needs to be the defender of ‘place’ (Belzer et al, 2004). How this is funded is thus critical to explore. The second major challenge identified was that public transport use remains associated with the poor. It was argued that as long as this persists ‘the real estate value around transit might not be appreciated’<sup>54</sup>. This second point is one that has not been grappled extensively in literature in developing world contexts. Exploring how to generate more choice public transport users is an important issue.

<sup>51</sup> Interview with representative from the JDA

<sup>52</sup> Interview with representative from the City of Johannesburg transport department

<sup>53</sup> Interview with representative from the City of Johannesburg Development Planning Department

<sup>54</sup> Interview with representative from the City of Johannesburg Development Planning Department

The JPC respondent understood the most predominant challenge to TOD to be the ‘over reliance on the car and reluctance to give it up’<sup>55</sup>. It is perhaps concerning that there is no shared understanding of the major challenges across the city stakeholders. An observation from these results highlights that each of the departments views on challenges are arguably issues which exist outside of their direct realm of influence. Developing a shared understanding of the challenges and thinking more critically through the challenges which a particular department could contribute to overcoming, through their direct influence, would arguably be a more focused and effective approach.

According to the respondent from PRASA network planning the integration of approach between all stakeholders is the single greatest barrier. Achieving greater collaboration in this area will provide the grounding to achieve effectively integrated outcomes. I argue that a critical starting point would be acknowledging the diverse understandings and interests which exist in TOD understandings and interests across all the stakeholders.

This was supported by the Intersite representative who added that there was ‘a lack of implementation tools to achieve nice policy’<sup>56</sup>. Furthermore the reactive nature of municipal planning was seen as a problem in that municipalities are not developing plans to facilitate and shape growth. When I mentioned the ‘corridors of freedom’ strategy as an example of where the city is trying to be proactive the respondent acknowledged the effort but highlighted that it does not assist PRASA in their TOD efforts as it explicitly focuses around BRT infrastructure noting that ‘nothing of a similar nature was being prepared for rail stations and corridors’<sup>57</sup>. This arguably demonstrates further support for thinking about a TOD emphasis beyond the BRT system.

Amongst private sector responses barriers focused on financing and tenants parking demands which related to concerns around the quality and coverage of public transport services. The Standard Bank representative explained that following the global financial crisis of 2008, the global banking fraternity published the III report which calls for higher equity to debt ratios. Essentially meaning that banks’ balance sheets must contain higher equity amounts relative to debts, this inherently limits the ability of retail banks to invest in property and especially affordable housing. Property is seen to be less attractive to other asset classes and residential property is seen as the most risky. The respondent explained that the ‘bankability’<sup>58</sup> of TOD style projects (after I had explained what TOD represented in principle) is questionable and did not seem confident in the ability of such projects to actually materialise.

The Intaprop respondent highlighted existing development processes which the private sector have come to understand and interact with successfully and resisting change was seen as a major barrier. This perhaps reemphasise the need for greater levels of dialogue between stakeholders to facilitate an effective shift in planning and development application processes. Secondly, the respondent from Intaprop highlighted that in their experience existing community resistance to change which is perceived to disrupt the status quo can be a major obstacle. This is

<sup>55</sup> Interview with representative from JPC

<sup>56</sup> Interview with representative from Intersite

<sup>57</sup> Interview with representative from Intersite

<sup>58</sup> Interview with representative from Standard Bank

an important consideration as existing well resourced, connected and wealthy community groups can be very effective in resisting new development to protect the status quo.

Understandings of the greatest challenges faced vary considerably across all stakeholders. This analysis has pointed out some key identified challenges which might not have been covered extensively in existing literature and would need to be explored further in a South African context. The extent to which these challenges have been informed by international experience is unclear, but this analysis does provide a sense that individuals have a much greater and more detailed understanding of the challenges than is reflected in policy and strategy documents. Furthermore, this brief engagement with stakeholders who were completely unaware of the concept have yielded a discussion regarding some of the perceived challenges and arguably illustrates the power and importance of dialogue between stakeholders.

#### 4.6.2.5 What are the solutions to overcoming TOD barriers?

Responses to this question were directly informed by the understanding of major challenges. Responses to the question arguably highlighted that detailed thinking around overcoming identified issues had not taken place. The JDA respondent called for development planning processes to become stricter, but did not elaborate on how this might occur. It also argued that incremental approaches to densification will be required to ensure the development of adequate urban management capacity.

The Transport Department respondent simply listed political will, partnerships with developers and pro-active land use planning as the critical solutions to overcome TOD challenges with no elaboration on what form these might take. At a high level this showed strong alignment to some of the critical enabling factors for TOD internationally. When enquiring further about how these might occur it was clearly indicated that views on these issues would be personal and that the correct people to discuss were colleagues in the Development Planning Department. Interestingly the Development Planning Department representative indicated that a vital solution is the continuation of public transport improvements to provide quality, efficient and integrated services to attract choice users. This is the responsibility of the Transport Department but was not mentioned in their response. Furthermore, the Development Planning Department respondent explained that investing in the provision of high quality public spaces around public transport stations and purchasing land to facilitate the development of affordable housing was essential to overcome gentrification. The details around implementing these solutions were not arrived at yet and the department indicated that they were still working through these. The Development Planning Department respondent made no mention of the importance of building partnerships with developers as suggested by the Transport Department representative. The JPC representative indicated that the solution to overcome the challenge of over reliance on vehicles was to the development of large scale car hire schemes. This focus on transport issues is somewhat confusing given the important role of property developer partnerships and the development of municipal owned land mentioned by other municipal representatives. These are areas which the JPC would have clear influence.

PRASA network planning's respondent called for the increased collaboration amongst public and private sector stakeholders and highlighted that the Intergovernmental Planning Committee (IPC) structures which were already in place was a useful platform to drive such collaboration. Currently however, IPC is used for facilitating the alignment of public sector

plans. According to the respondent PRASA is making the case for collaboration as opposed to alignment which does not facilitate integration. This is still a work in progress. The Intersite representative called for municipal planning departments to clearly define what TOD meant and what objectives were trying to be met. Furthermore the municipality needed to develop frameworks, parameters and implementing tools to guide public and private sector investment. I indicated that the City of Johannesburg had developed strategic area frameworks for the corridors and asked whether the respondent was familiar with these. He indicated that he had seen the documents but had not examined them in detail as they did not interact with rail.

Of the private sector respondents who identified challenges Investec respondents indicated that the solution to overcoming parking demand challenges was improved public transport services which covered greater parts of the city and offered quality services. I explained the practical financial difficulties of extending public transport services in a vastly sprawled low density city such as Johannesburg by drawing on the Barcelona-Atlanta comparison made by Bertaud (2004) (See figure 2). I indicated that without significant densification through development it was unlikely that such improvements would reach more portions of the city's population. Hypothetically grappling with catching public transport to work respondents indicated that car sharing facilities might be a useful way to overcome work travel demands.

Intaprop's respondent replied by arguing that for them part of the solution was for transport to be planned for areas where private property developers were likely to invest. This is clearly an area which would benefit from meaningful discussions and negotiations. Also, a critical solution to overcome procedural challenges was that plans and processes needed to be simplified and more prescriptive to ensure swift approval and implementation.

#### 4.6.2.6 What density levels are required to achieving effective TOD?

Similar to international literature on this issue the responses to this question varied considerably. While some respondents had clearly not arrived at any answer, those who had developed a view provided different measures of density which made it difficult to get a sense of how they compared. The JDA respondent indicated that the desired density levels for the corridors were available in the SAFs. These were expressed as '41 632 people per square kilometre' (City of Johannesburg, 2014), how this relates to conventional measures of density is unclear. The Transport Department respondent indicated that they were unaware of the exact densities but that from an operator perspective the desired ridership was 10 000<sup>59</sup> people in the morning peak (currently 5 000 passengers). Achieving bi-directional flows was argued to be important and in this regard it was more important to consider land use configurations than density. The Development Planning Department respondent indicated that it was 'difficult to be absolute about this (densities)' but that the UNHabitat principles of good urban form defines ideal densities as 15 000 people per hectare. The JPC representative indicated that a minimum of 200 units per hectare is required. The PRASA network planning respondent indicated that '80-100 units per hectare is the desired densities to ensure that 20 000<sup>60</sup> people per hour are being transported'<sup>61</sup>. Other stakeholders interviewed did not have an idea of required densities.

<sup>59</sup> As no mention of passengers per direction per hour was mentioned in the response, it is assumed that this refers to 10000 passengers per direction per hour in the peak.

<sup>60</sup> As no mention of passengers per direction per hour was mentioned in the response, it is assumed that this refers to 20000 passengers per direction per hour in the peak.

<sup>61</sup> Interview with representative from PRASA rail network planner.

The Intaprop representative indicated that urban form measures of density were not sufficient and activities and people trips and jobs were important to consider.

This representation of required density highlights that much work is still to be done. Cooke and Behrens (2014) indicate that density targets of 140-190 p/ha are more likely to achieve more financially efficient transport operations. The interview responses vary significantly in unit measurement and quantity. While transport operators have linked understandings to passenger numbers, these understandings have not been reflected in other responses. This general density to transit approach arguably neglects the importance of a station context specific emphasis placed on TOD application in the international literature. It also potentially highlighting the lack of stakeholder co-ordination at all levels in thinking through TOD implementation.

#### 4.6.2.7 Are you aware of any major obstacles to achieving the desired densities?

Responses to this question were limited. However there were some clear synergies identified. Respondents from the JDA, Transport Department and Development Planning Department all indicated that existing residents' objections presented a challenge to achieving higher densities. This resonates with one of the major challenges identified by the Intaprop respondent. The Development Planning Department and the JPC respondents indicated that providing for supporting infrastructure for higher density might present a challenge. While the JPC respondent and Investec property developers explained that existing parking requirements and tenant demand for parking presented significant cost implications to achieving higher densities.

PRASA network planning's respondent indicated that household size can be problematic when developing density targets as in certain cases a single person is living in a unit. We discussed that perhaps people per hectare would be a more appropriate measure.

#### 4.6.2.8 What is your organisation/departments role in contributing towards the realisation of the TOD agenda?

The JDA respondent explained that the JDA is responsible for managing housing development along the corridor and there are currently projects in the pipeline, furthermore the agency is responsible for managing upgraded to the public realm which is critical to prioritising pedestrian movement. An experimenting and learning role was also alluded to in the interview. The role of the Transport Department was explained to be the provision of affordable public transport and prioritisation of NMT. The Development Planning Department representative articulated clearly that the department is the 'major policy proponent behind entrenching TOD as an approach to city form'<sup>62</sup> and that other departments hold the building blocks (i.e. Transport Department providing quality public transport). It was also indicated that the department is responsible for co-ordinating various investments to ensure they 'happen in a manner, time and pace that is true to the principles underlying TOD and that optimum value and efficiencies are extracted from these investment'<sup>63</sup>. The JPC respondent expressed the role to be realising the minimum requirements of TOD on municipal owned land and demonstrating no car development solutions. It is clear that municipal respondents have a well conceptualised understanding of the role which their respective departments have to play in realising TOD.

<sup>62</sup> Interview with representative from the City of Johannesburg Development Planning Department

<sup>63</sup> Interview with representative from the City of Johannesburg Development Planning Department

The PRASA network planning respondent indicated that their role was to ensure that stations along the rail network were developed to encourage TOD. The Intersite representative indicated that their role was to 'leverage and co-ordinate private sector investment on strategic land holdings to grow the revenue base for PRASA'<sup>64</sup>.

The private sector respondents were less aware of a role they could play in implementing a TOD agenda. It is clear that further engagement is required around this issue.

#### 4.6.3 STAKEHOLDER ANALYSIS OVERVIEW

The stakeholder analysis has highlighted two important issues that would not have been otherwise difficult to identify in the analysis of the Johannesburg case based only on a policy and strategy review. Amongst the respondents who had begun to form opinions on TOD there is an indication of awareness and engagement, in a more detailed manner, with some of the challenges facing TOD. These are generally in line with those which have plagued TOD efforts internationally. However, the understandings of the most critical challenges are significantly divergent and could lead to weak efforts to overcome such challenges as efforts are spread thinly targeting various issues. Furthermore the extent to which meaningful strategies and efforts to overcome these challenges are being developed is unclear. Whilst there are signs that public sector stakeholders are discussing these issues internally and in some instances attempting to drive improved levels of integrated planning across the three spheres of government, communication and participation with private sector actors remains limited. This is clearly reflected by the deficient understanding of the TOD concept amongst the private sector stakeholders interviewed.

Interestingly financing was identified by the private sector respondents as a major challenge but this was never picked up in great detail by the public sector respondents. Understanding the important enabling character of finance is critical to TOD and it seems that much research and collaboration around possible sources of finance are important. This is argued to especially be the case where an income diversity agenda is clearly a prominent component of TOD thinking within the municipality.

Similarly the issue of political will and support was picked up by the Transport Department respondent but not really reflected upon in detail. I wonder if it will require the kind of political championing that the South American urban transformation efforts have become associated with where mayors not only preach the public transport priority but live it every day to generate wide spread public support, or whether it will require the kind of bold leadership and decision making representative of more autocratic regimes underpinning many Asian cities improved land use transport integration? What is clear from literature, both international and local, is that TOD will require significant shifts in the manner in which decisions are made.

In this regard perhaps one of the most evident gaps in the responses was the importance placed internationally on the formation of specialised institutional arrangements which enabled the necessary room for TOD decision making to happen outside of mainstream (often TOD disabling) approaches to development to ensure outcomes are achieved. This is perhaps an area which requires significant consideration especially in the early stages of implementation efforts. In many respects this is surprising given many respondents acknowledged that the current

<sup>64</sup> Interview with representative from Intersite

frameworks for decision making were deficient in being able to generate principled TOD outcomes.

Of all the land development dynamics perhaps the one which is most prominently reflected by the respondents is the need for stronger alignment between stakeholders and greater collaboration to achieve TOD outcomes. This is argued to be a positive indication of the extent to which TOD challenges are overcome as it is argued in this report that the multiple-actor nature of TOD is the overarching factor which connects to each of the other technical components or 'softer' land development dynamics. If greater dialogue, collaboration and consensus can be built around a TOD agenda between the range of stakeholders who are ultimately responsible then much of the other issues will arguably begin to be worked through in a more pragmatic manner. The starting point of such a way of working is to acknowledge that no single entity can achieve TOD goals by working in spite of the other stakeholders who will have a role to play in the planning, financing, delivery, management or occupancy of TOD outcomes. It is not clear from the series of interviews that the TOD understanding and approach in Johannesburg has evolved to the point where the municipality is facilitating the multiple-stakeholder engagement required to bring various stakeholders together to plot a way forward jointly.

From a scale perspective it seems that the municipal focus of TOD along the corridors is a point of concern for those stakeholders with vested development interests around public transport networks outside of the corridors. This is limiting as the concept holds much potential outside of the corridors where other stakeholders are clearly invested and would be interested in making a contribution to TOD. This is perhaps an outcome of the fractious public transport landscape in South Africa where BRT is the clear focus of municipalities. This is a potential weakness in being able to generate the interest and energy around a TOD agenda based on other modes of transit in operation throughout the region.

#### 4.7 SUMMARY AND CONCLUSION

This chapter has argued that TOD principles were grounded in the GDS (2006) and formed a more explicit component the GMS (2008) thinking. As such the municipality has a long history of driving TOD principles. They have always been associated with the ideas of inclusion and compaction to drive socio-spatial transformation. The 'corridors of freedom' arguably represent a consolidated and more prominent emphasis on a TOD agenda in the city as reflected by it becoming the overall strategic development agenda for the City of Johannesburg. Beyond the visioning document a set of SAFs have been developed for each of the corridors by a number of consultants, these are the only formal documents indicating the municipalities approach to TOD.

While the SAFs reflect the high level generic principles associated with TOD as evident in the international literature they do little to provide more detail on what each of these issues actually mean in the context of the corridors. There is limited acknowledgement of the important differentiation which will need to be applied to different station contexts along the corridor. While it is acknowledged that these are spatial documents and are not intended to provide strategic insight as to how the TOD agenda will be implemented from an institutional, financial and stakeholder engagement perspective, the lack of available documentation around these issues is concerning. It begins to raise questions as to how the content of the vision and the details contained in the SAFs were arrived at. It is argued that in order to get a true sense of

The stakeholder analysis revealed that the municipal respondents had relatively consistent high level understandings of what TOD means. With most respondents indicating that it was a tool to achieve socio-spatial transformation and restructure the apartheid city. However, there were some clear discrepancies in the detail of their understandings towards this end where different representatives highlighted different points of emphasis, often pointing to the largest barriers as those issues outside of their departmental decision making realm. Something which is not clearly evident and acknowledged in the international literature but is the importance of inter departmental integration which comes through in the limited South African specific TOD literature.

PRASA's representatives understanding of TOD did not resonate strongly with the municipal understanding and largely saw TOD as a means to leverage greater revenue from land holdings, displaying a much stronger link to the financial sustainability of transit. This is consistent with the interest of transit operators and the contestation of interests that international literature illustrates. However, the municipality who is also a transit operator in this environment has opted to focus more on utilising TOD to drive socio-spatial restructuring. While in theory there is possibility for these objectives to co-exist international experience highlights that the detail requires close attention.

The municipality respondents indicate a clear intention to ensure that affordable housing becomes a critical component of the cities TOD agenda. However, while some respondents feel that this will be exceptionally difficult to achieve others see it as the most significant opportunity associated with TOD. The lessons from international experience are clear on the poor ability of TOD efforts to accommodate lower income households. If this is to be achieved in South Africa significant support is going to be required from multiple sources. The subsidised



housing programme perhaps presents a key opportunity in this regard but the current misalignment in thinking across the three spheres of government is alarming.

A positive sign is that amongst the understandings of the most major issues facing TOD the interview responses highlighted a much stronger appreciation for many of the most critical issues identified internationally which are not reflected in policy and strategy documents. However, the extent to which these have been engaged with and worked through is unclear and much of the detail surrounding these issues is not evident or various significantly. The responses on the densities required, the role of the housing subsidy, the financial challenges and the stakeholder collaboration clearly indicate that much work is required in developing more detailed and shared understandings of TOD and that perhaps practitioners have not yet considered insights available from international TOD implementation experience.

Furthermore by focusing TOD efforts around a single public transport mode the municipality does seem to be losing an opportunity to engage a broader set of stakeholders who are interested in (or actually are) developing land around transit stations in other parts of the city.

## 5 TOD UNDERSTANDING: ADOPTION OR ADAPTION?

### 5.1 INTRODUCTION

Wilkinson (2006) suggested that TOD would need to be adapted to suit the South African context, but did not go into much further detail as to what such an adaptation would look like and how far it could deviate from the original TOD concept (which in its own right is ever evolving), in contrast the NDP called for the application of internationally accepted principles. This section will draw on the findings of the research to provide a critical discussion of how TOD is being understood in South African context following these directives. I argue that the research has highlighted that TOD represents a term, a product but is equally (and in many respects more importantly) a process. This is an important finding which informs the analysis of this chapter. Core to the discussion will be a reflection on the extent to which this research indicates whether current TOD understandings in South Africa have been adopted or adapted to suit the local context. Specifically this chapter aims to answer:

- Is there evidence that international lessons have been applied to develop an adapted TOD thinking in South Africa?

### 5.2 TOD AS A TERM, PRODUCT AND PROCESS

Upon interrogating the findings of the research I argue that TOD is a relatively complex concept to engage as it is featured as a term, a product and a process. It has prominence in being drawn upon simply as a term. The term has become synonymous with thinking around land use transport integration. The TOD term has played a fundamental role in succinctly capturing and popularising intentions for improved land use transport integration and has gained traction in many parts of the world.

TOD is also associated with a particular set of physical outcomes and in this regard has featured prominently as a built environment product. TOD is globally recognised as development which in broad terms is made up of 'medium-high' density, a mix of land uses, reduced car parking, high quality pedestrian realm prioritizing pedestrians over cars and ensuring quality links to the public transport station. Increasingly there is a push for TOD to provide a range of affordable housing units to achieve income diversity. This broad product based understanding of TOD is informed by these physical characteristics and has been a large selling point of the concept as the theoretical benefits of achieving these outcomes is clearly identifiable and widely supported internationally. Urban practitioners are able to identify with these principles as they resonate strongly with those of sustainable urban development. However, the specific detail of this physical product is less internationally uniform and accepted than is perhaps suggested in the NDP. There are clear differences in the detail of the how the physical characteristics are actually being thought about in various contexts. So while the same set of generic principles is informing efforts the envisioned and actual outcomes vary in their detail, form and design. The idea that actual TOD outcomes can vary significantly in the way they look across different contexts is argued to be an important distinction in understanding TOD as a product.

The research has arguably highlighted that TOD is as much a process as it is a term and a product. In much of the international literature reflecting on TOD outcomes the process has been at the centre of discussions. What the literature review highlights clearly is that actually

achieving TOD outcomes is exceptionally challenging and requires much emphasis to be placed on a set of procedural or softer issues which surround land development dynamics. International literature seems to suggest that these issues are pivotal to effective TOD. The TOD process is complicated and resource intensive demanding major stakeholder collaboration and strong visionary leadership. Furthermore a clear lesson from effective TOD outcomes is that they involve extra-ordinary approaches to development outside of the mainstream institutions, procedures and systems, at least in the initial stages of attempting to implement the principles associated with the concept.

### 5.3 CLEAR SIGNS OF ADOPTING THE TOD TERM

This research was informed by the clear evidence that the TOD term has been drawn upon in South African urban policy. The NDP calls for the application of internationally accepted transit oriented development principles. This in its own right provides a clear indication that South African urban development practitioners and policy makers have been influenced by the globally circulating discourse on TOD to some extent. Arguably this illustrates that a clear link has been established between the characteristics of TOD and South Africa's own urban policy objectives. The NDP however, only mentioned the TOD term and went into no further detail on what was meant by internationally accepted principles in terms of a product or process, thus providing a very limited understanding of TOD. Similarly, the South African specific literature highlighted that the term is often utilised without further interrogation and exploration of what it might require in practice.

### 5.4 ADAPTION IN OBJECTIVE BUT NARROW APPROACH TO PRODUCT ADOPTION?

The idea that TOD has the ability to achieve socio-spatial transformation in South Africa is arguably by itself an interesting adaptation to the conceptualisation of TOD internationally. It is in many ways a departure from the restriction in car usage objective which more traditionally underpins TOD, even in explicit application of TOD in other parts of the developing world. This adaption perhaps requires questioning of whether TOD represents an adequate tool to achieve this objective. However, the adaptation in the objective is closely aligned to the broader socio-spatial goals of restructuring the spatial and socio-economic inequalities of apartheid which continue to define South African society and is thus argued to be relevant and necessary. Wilkinson (2006) argued that a TOD agenda striving for such an objective would require adaptation. I support this position and intuitively expect that this nuance in objectives should result in an adaption of the understanding of TOD.

However, there is limited indication that adaptive thinking has followed the adapted objective of TOD. As has been mentioned previously understanding and arriving at the set of common TOD principles is fairly straightforward. This is largely because they are now widely publicised but also because in theory the principles and the benefit they provide is clear to identify. In South Africa there are clear and strong signs of adopting the principles in this regard. For the most part TOD as is reflected in South African academic, practitioner and public policy based literature is broadly identical to the globally common principles of TOD. This arguably illustrates that local practitioners have engaged with broadly publicised and circulated global TOD discourse on the narrow listing of the TOD principle based product (without examining what the more reflective literature on implementing TOD principles suggests). There are some recent indications that researchers and practitioners are beginning to think through what a

I think it is important to identify that even where a clear socio-spatial transformative rhetoric exists (i.e. the City of Johannesburg) there is also a common and prominent interest in TOD from a public transport financial operations perspective where there is increasing pressure to utilise land development as a way to create greater ridership but also diversify revenue for operators. These are both relevant objectives but signify a slightly different focus from the emphasis to restructure spatial inequality in South Africa. The extent to which these objectives can co-exist is unclear but not necessarily unfeasible. These discussions are critical to arriving at an adapted understanding of TOD.

Seemingly South Africa and the City of Johannesburg more specifically have adopted TOD principles to inform a largely generic understanding of the TOD product. What has not been identified and adopted as strongly is the important point that TOD outcomes vary considerably across different contexts even within a local area. The nature of high density, land use mixes and requirements for reduction in parking and public realm improvements all require a detailed understanding of station contexts which inform appropriate responses. The generic Curitiba type high density corridor imagery being promoted by the City of Johannesburg underestimates the intricate realities of achieving such development. Furthermore, Suzuki et al (2013) have made interesting findings about the limitation of median style BRT stations and the poor connection they share to surrounding land and property development. They argue that integrating stations with the broader surrounding area is critical to leverage TOD responses. Specifically they are critical of Bogota's Transmilenio BRT system's (which the Johannesburg system is modelled on) ability to yield property development responses. It does appear that this is an area of concern which should directly inform the nature of the TOD product South African practitioners seek to produce. The city of Johannesburg's TOD approach seems like a combination of a Bogota BRT system with a Curitiba corridor development strategy without necessarily thinking through in detail the particular issues which informed and enabled such an approach in these respective contexts. In South African cities where contextual realities differ significantly at the local level it seems that appreciating the learning that TOD outcomes, while informed by generic principles, can lead to different types of physical outcomes is critically

important. Furthermore, achieving this nuance might require a select few station precincts to be targeted, especially where the first real TOD steps are being taken in a city, to inform a detailed TOD product.

## 5.5 THE CALL FOR MORE DETAILED TOD ADAPTATION

Overall the review of South African understandings of TOD indicates that only a narrow learning from international literature has occurred. There is no clear indication that deeper engagement with implementation experience and the critical lessons provided has informed South African TOD understandings. Even where interviewed stakeholders are reflecting on challenges which resonate with international experience there is no referral to engagements with international lessons but rather these seem to have been arrived at through each stakeholders own intuition or experience. There is the possibility that South African practitioners will learn as they implement and adjust their approaches and expectations relative to the lessons provided from their own experience. However, I argue that this would represent a missed opportunity to learn from the practice in other contexts and leapfrog many of the short-comings which have plagued TOD implementation efforts internationally.

In Johannesburg there is an interesting emphasis being placed on affordable housing and the absorption of the poor along the corridor (the details of which are not publicly available). This arguably does represent a fairly significant adaptation from traditional TOD approaches. While affordable housing is being increasingly included in TOD objectives internationally, a significant emphasis on providing extensive affordable accommodation along the corridors of freedom is not a commonly associated TOD outcome. However, what this adaptation does not acknowledge is how difficult it has been internationally to provide affordable accommodation in TOD implementation efforts. These similar challenges have arguably not escaped South African housing efforts over the past two decades. Wilkinson and Marks' (2007) suggestion that the gap housing market might be the most strategic target for TOD is worth consideration but does TOD targeted at a particular income group and largely residentially focused encompass an imaginative adaption of TOD in South Africa?

The potential of the subsidised housing programme to drive a more TOD based approach does not seem inconceivable but what is clear is that it will be more resource intensive and potentially lead to the production of less units than the current approach to state subsidised housing delivering. This is not politically attractive and the current indication from the national department of human settlements has arguably been to adapt the delivery model towards a 'mega-project' approach in many respects reflective of large peripheral land holding, 'greenfield' based private sector developers. This is despite the increase in emphasis at the local level on TOD. There is no evident influence of the TOD directive in the NDP on state based housing delivery. This is a major concern for the ability to drive an effectively adapted approach to TOD in South Africa. The international literature review focused on the developing world has provided some insight as to what an adapted TOD understanding might begin to look like.

With regards to understanding and engaging with TOD as a process there is a major deficit and this is perhaps why there is such a poor ability to articulate and develop an adapted approach to TOD to suit the South African context.

The intersection of an adapted objective for TOD in South Africa with a more traditionally adopted narrow generic understanding of the concept make it difficult to distil clearly the extent to which the product understandings have been adapted or adopted. One issue which is clear from international literature is that context has been a key informant to the development of TOD understandings. There is arguably evidence of the concept adapting throughout its existence in North America as academics and practitioners have gotten to grips with what it means in practice and in outcome. Such an evolutionary approach to TOD should permeate South African understandings and as such it is argued that the potential to adapt TOD to best achieve broader policy objectives of inclusive compact growth should be widely explored. While there is a clear indication that adoption of the generic physical principles has occurred, it is argued that international literature and experience should be drawn on to provide learnings for how to approach and think about how TOD can be effective across the many diverse contexts that South Africa presents. In some instances these learnings might constitute a similar approach and outcome to those evident internationally in others it might require developing a different process to achieve processes and outcomes which have not yet been done elsewhere in the world.

## 5.6 THE DEFICIT PROCESS UNDERSTANDINGS

A critical issue emanating out of the research is that there is far less appreciation and understanding of the process based issues surrounding TOD in South Africa as reflected in literature but also among key stakeholders. International literature has highlighted that where land development dynamics have been considered and addressed it has enabled outcomes to be most effective. The research has arguably highlighted that in South Africa the important learnings about the role of process have not been appreciated strongly enough.

However, there are broad indications that some of these issues are being engaged with and it would be inaccurate to suggest that they are not being thought through at all. There is a clear call for alignment and integration between various departments and stakeholders, evidenced by the interdepartmental meetings within the City of Johannesburg and the integrated planning committee meeting at a vertical public transport level (although this is not TOD specific). There are also indications from the interviews that public consultations have been conducted by the City for community members interested and affected by the corridors and have had an impact by reducing the density targets of the corridors through strong community resistance<sup>65</sup>. Furthermore there is evidence that the City has also engaged with private developers to discuss Corridors of Freedom plans<sup>66</sup>. Similarly PRASA through Intersite have approached private sector developers to partner for strategic land development. There are clear deficiencies with regards to financiers' knowledge and understandings of TOD and the limited TOD specific funds available are perhaps telling in this regard. While there are signs of alignment effort, perhaps slow progress can be attributed to the fact that TOD requires more than consultation. It requires collaboration and partnership at all levels of defining TOD the product (what is the vision) and

<sup>65</sup> Discussed in the session as outlined below.

<sup>66</sup> As part of the research I attended a presentation delivered by the consultants responsible for drafting the SAF for one of the corridors. It was attended by a small number of developers (some of whom were approached for interviews but never responded), who were being informed for the first time about the revised plan for the corridors. They all expressed major concern at the reduction in density allowances relative to what they could make work in the area. The idea that the ground floor could not be used for parking was also contested strongly.

TOD the process (how will the multiple stakeholders make it work). This research has arguably highlighted that this is not currently the case.

The point is not that the land development dynamics are not being engaged, as many would have to be complied with through regular development procedure. Rather the critical reflection is on the extent to which the learnings from international experience in this regard are being drawn upon and incorporated in understandings in South Africa. Of key concern is the limited extent to which the important emphasis being placed on land development dynamics internationally is being reflected in South African TOD thinking.

## 5.7 IMPORTANT LESSONS FOR DEVELOPING AN ADAPTED TOD UNDERSTANDING AND ASSOCIATED PROCESS

Based on the literature there are some important questions to ask with regards to adapted TOD in the South African context. How might lessons provided from international literature assist in thinking through developing an approach to TOD in the dualistic context of South African cities? What are the opportunities for public or private formal sector capital to invest in a TOD agenda relative to the lessons from international experience? How can TOD efforts be adapted to the extent which they shape informal private capital investment and draw on resources from other sectors to invest in the provision of high quality community and public facilities in areas of informality and poverty? Who are the multiple-stakeholders who will have a role to play?

What is clear is that internationally a multiple stakeholder approach to TOD visioning, planning and implementing has been essential to achieving effective TOD outcomes. Collaborating around a city building transformative process is admittedly complicated, especially in light of the many other day to day challenges that face municipalities in the Global South. However it is argued that developing a framework for decision making which brings together the perspectives of multiple stakeholders is critically important.

This might take the form of a highly collaborative municipal integrated decision making framework, in theory the IDP is envisioned to be such a tool and this is perhaps the route that the City of Johannesburg has attempted to go, but the extent to which IDPs have been able to co-ordinate multiple-stakeholder investment has been questioned (Harrison, 2006) and might need to be thought through as a basis for driving TOD. In other cases a specialised TOD unit where people from various sectors are employed to bring development perspectives to a municipality which are not generally found in such an institution. Alternatively it might require providing a forum where stakeholders are invited to debate and table their ideas, concerns and requirements. Or it could involve providing real decision making power to a single department responsible for co-ordinating development actively seeking for investment, financing and community based partners as was the case in Cleveland.

I think what is important to note is not necessarily the particular arrangements but rather to think through what approach would bring stakeholders together and provide for multiple dimensioned decision making. This could encompass a range of approaches. The point about decision making power is also important as it carries particular political support. If a department tasked with implementing TOD has limited influence over land development approvals, public realm and infrastructure investment and upgrades and transport investment decisions then it becomes that much more difficult to drive TOD. At the basis of enabling

effective TOD these issues are argued to be essential as they inform the process moving forward.

The importance of a common and clear vision and objective of TOD is clearly emphasised. Essentially this requires developing a stronger collective sense of what is the overarching strategic objective of TOD in South Africa? This should be informed by national policy directives. There seems to be three possible objectives in South Africa at present, the traditional car reduction objective has been made broadly, the transit operating financial sustainability objective is generating increasing attention and then, arguably the most prominently featured, socio-spatial restructuring objective can all be identified. These objectives do not automatically contradict each other and there is the opportunity that they could complement one another. However, I argue that based on international literature it is critically important that an overarching primary objective be provided. This will inform the nature of an adaptive TOD process. Currently the lack of direction could be argued to be a limiting factor for TOD understandings across the country. In the City of Johannesburg it is relatively clear that the primary policy objective of TOD is to drive socio-spatial transformation. However a perhaps more pressing practical objective is ensuring the financial viability of the BRT and rail systems. The evident discrepancies of TOD visioning across various stakeholders is one of the most major concerns.

This notion of reconfiguring the spatial inequalities and inefficiencies inherited from apartheid has been a long standing central pillar of democratic South African urban policy with many of the underlying principles such as densification, mixed land use development and inclusion arguably in line with TOD principles. Critical questions then need to be asked as to how TOD will overcome these issues? I argue that the value proposition of TOD does not lie in popular and easy to buy into product messaging but rather that it provides an opportunity to interrogate the land development process more broadly. Such an exercise will assist in thinking through what it takes to enable and facilitate more compact and inclusive urban development which prioritises pedestrians over private car users. Such learnings arguably offer to strengthen urban practitioners' ability to build inclusive and more efficient cities.

The upfront visioning and intended objectives of TOD are key to informing new ideas around a collaborative process which can lead to targeted outcomes. Bringing the private sector developers, businesses and financiers along with community representatives to establish the overarching objects of a South African TOD agenda is arguably important. If the primary rational for TOD is to drive inclusion within spatial restructuring then that needs to be made explicit to all stakeholders and be bought into collectively. I acknowledge that this is not a straightforward process and it is bound to result in contestation, debate, negotiation and extensive dialogue. Perhaps many private sector stakeholders will not see the value in such dialogue, but the socio-spatial and economic inequalities ultimately underpin and impact on business environments in the country and thus it is in everyone's interest to buy in to such spatial transformation initiatives.

It will require political championing and leadership across all stakeholder groups. Once the role of TOD in a socio-spatial transformation agenda is more widely established and understood it would provide an opportunity for the various stakeholders to apply their minds as to how best to contribute and still insure their interests are represented. Providing a combined knowledge

set as to how to achieve specific densities and mixes of land use and what it would take financially and in turn how the municipality could support such development. What international literature highlights clearly is that no single entity can achieve TOD alone as it contains too many facets which depend on decisions made by many other actors. As a point of caution, currently it does seem that the City of Johannesburg is aiming to do too much on their own and not collaborating sufficiently with the other stakeholders who have been instrumental in achieving effective TOD internationally.

With regards to overarching objectives the socio-spatial restructuring link to TOD in South Africa demands attention when thinking about the particular process to achieving the objective. International experience suggests that it has been virtually impossible to achieve inclusion of poor and low income groups in TOD development. While in many of these contexts the state does not have a significant subsidy housing programme it is important to acknowledge the issues of replacement and removal which have been identified in attempts to provide affordable housing in TOD projects. Much work is required in South Africa to align the national housing programme with local area planning for TOD (the extent of assignment of the housing function to the local level is unclear). SPLUMA does hold much potential for municipalities to drive improved co-ordination, but municipalities will need to explore how to most effectively implement the new planning legislation. Part of the support and alignment will require upfront understandings that the same number of units as an RDP approach simply cannot be achieved in a TOD environment as they will be more costly and take longer and might still not yield the desired occupancy objectives (as recipients of subsidised units might be persuaded to move out due to a range of lifestyle factors and pressures). Such efforts will need to be understood as learnings and will need to be closely monitored and researched as have attempts internationally.

The availability of finances for TOD is critically important not only for development purposes but also for potential occupants. Marks and Wilkinson (2007) hypothesised the applicability of the concept of Location Efficient Mortgages (LEM) in South Africa as a driver of TOD, the clear call was that much more work and understanding around such potential is required. The idea behind LEM products, which have been utilised in the American context as a demand side driver for TOD, is that they allow households who can demonstrate that they do not own a car can afford to an opportunity to access a higher mortgage and in that way potentially live in a better location well serviced by public transport. This requires a tighter administrative process for financial institutional lending beyond what the banks currently provide. Marks and Wilkinson (2007: 417) argue that 'A locally-based specialist TOD agency would undoubtedly offer benefits in terms of the sort of highly focused effort that would be required to pilot the innovative approach that has been proposed.' This idea of a specialised TOD agency has not been explored yet and based on international experience this remains a potentially important consideration.

Internationally there are many innovative approaches to establishing funding and finance for TOD projects. These are argued to have been essential in driving initial TOD attempts. A range of sources are drawn on and explored due to the multiple layers of development often requiring separate financing. There are promising signs internationally that TOD present financially viable investment and in the long run are proving to be exceptionally valuable where units often sell for more than in surrounding non TOD areas (Hook et al, 2013; Cervero, 1998; Dittmar and Ohland, 2003).

## 5.8 POVERTY AND INFORMALITY TARGETED TOD

In many respects a more important finding is that even the more nuanced and detailed understandings of TOD reflected by practitioners and literature do not provide valuable insights in how to deal with the contexts of informality and poverty which will persist in South African society. This is acknowledged to a certain degree by an interviewee who stated that there is a limited ability to provide housing to poorer people along the corridors. If TOD is to be the strategic tool to transform the socio-spatial patterns of South African cities then 1) it will need to incorporate the lessons learnt from international experience into more detailed understandings TOD possibilities 2) need to think how the concept might be adapted and applied in contexts of poverty and informality. However, it is argued that effective interventions in the second area are as critical (if not more so) to achieving socio-spatial transformative goals. Given the emphasis placed on context informing TOD outcomes and approaches the research has attempted to make a clear case for an approach which begins to cover these two broad areas. While in the Johannesburg case the TOD emphasis remains primarily targeted at formal interventions even in areas where informality is prevalent<sup>67</sup>.

TOD remains a concept which provides a response in formal environments. While this is partly useful in a South African cities context, where large amounts of public and private sector investment is made in the formal development context, it is now prominently reported and accepted that a large amount of people will reside in informal settlements in the future. I argue that if TOD is to be the driver of socio-spatial transformation then informal environments cannot be neglected. There are some interesting examples of strategic investment being channelled around public transport stations in informal residential areas which ensure a mix of land uses. The National Treasury Neighbourhood Development Programme has begun some interesting work regarding targeted spatial investment in poorer areas of South African cities, with signs of explicit links to concepts such as TOD. This arguably represents a similar approach to those being driven in some South American contexts like Medellin. However, this thinking is yet to permeate municipal TOD thinking. This represents a potentially relevant yet rather radical adaptation to the TOD concept which is beginning to be explored in other developing world contexts but is yet to feature in South African thinking.

## 5.9 SUMMARY AND CONCLUSION

TOD understandings in South Africa have displayed an adaption of the overarching objective of the concept. Subsequently, there is a clear indication that the generic physical principles have been adopted without necessarily adopting or drawing on learnings from experiences and literature internationally. Such learnings arguably highlight that such an adaptation to the objective, combined with an appreciation of the specific station context should inform a far more detailed understanding of the physical principles per specific station context. I argue that the research has highlighted that there is not enough emphasis being placed on TOD as a process and as such the land development dynamics which have inform and enabled processes internationally are not being adequately thought through in the South African context.

<sup>67</sup> The corridors of freedom vision document displays a rendering of Orlando Soweto where houses and their backyard units have been replaced with apartment blocks (refer to figure 8) and the SAFs focus on the development of formal development responses along the corridor as do the municipal practitioners who were interviewed, with no single person mentioning the possibility of TOD in areas of informality and poverty. Rather low income earners were viewed as a major inhibitor of ensuring inclusive TOD.

The TOD corridors rhetoric might prove to be overambitious then when assessed relative to the international experience and suggestions that a more focused, select station approach, be taken to initial attempts to drive TOD. In this way efforts can be focused and more detailed with the potential for outcomes to be far more effective. Furthermore, taking on board an adapted understanding that TOD can drive socio-spatial restructuring arguably lends weight to the concept being applied in different ways across the variety of contexts on display in South African cities. Applying the international lessons across a variety of contexts which are served by public transport will provide for multiple approaches to TOD and different outcomes which can arguably reflect the broad internationally accepted principles of TOD which the NDP calls for. However, this will require far greater stakeholder discussion and engagement with TOD and what it means. Nowhere in the world have effectively reported TOD growth agendas been straightforward to implement by a single entity, furthermore it has always required major political support, redirected finances and funding and unique institutional arrangements. So while the City of Johannesburg might be driving improved internal TOD understandings through their plans and processes it is clear that extensive engagement with other stakeholders is urgently required as many in the private sector are unclear what the vision in fact is and how it impacts them, let alone the important role that they might play and how they can benefit.



## 6 CONCLUSION AND RECOMMENDATIONS

### 6.1 CONCLUSION

In the opening paragraphs I posited that the lived experience was at the core of the subject matter for the dissertation. The manner in which people are living and aspiring to live in urban areas in South Africa, coupled with a very deliberate and ongoing emphasis on the building of infrastructure for cars is in many respects driving the development of auto-oriented lifestyles. TOD is a concept which is located at the intersection of transport systems, urban development and the lifestyle choices. Each of these areas in their own right are complex.

At the South African Planning Conference in 2014 a panellist from the United Nations<sup>68</sup> remarked that she believes we are building our cities to fail us in the future. Even if one argues that this is a fairly dramatic statement, what struck me is that there is a similar sentiment which informs the drive behind TOD. A concept developed by urban practitioners as a way to build better, more sustainable and liveable cities which will carry the human race into the future on a stronger footing.

This dissertation set out to explore how TOD is being understood in the South African context by conducting a thorough literature review and analysing the city of Johannesburg's experience in attempting to drive an explicit TOD agenda. This included a series of interviews with a set of potentially influential TOD stakeholders operating in Johannesburg. The following set of sub questions were provided to guide the research:

- What are the 'internationally accepted' principles of TOD?
- What lessons are provided from international TOD implementation experience?
- How does available literature assist in understanding the dualistic nature of South African cities?
- How has the concept been understood in the South African context to date?
- How has TOD been interpreted in the City of Johannesburg?
- Who are critical TOD stakeholders in Johannesburg?
- How have the key stakeholders in Johannesburg understood the concept in general and their respective roles in driving TOD forward more specifically?
- What are understood to be some of the major barriers to achieving TOD in Johannesburg?
- Is there evidence that international lessons have been applied to an adapted TOD thinking in South Africa?

If the research has highlighted anything it is that TOD has not proved to be a panacea anywhere in the world as of yet. It is far more complicated, costly and time consuming than current approaches to development. While the internationally accepted principles of higher density, mixed land use, pedestrian prioritization (and increasingly included income diversity) are relatively straightforward, the key lesson from the international literature is that the understanding the detail of what these principles mean and how to realise them is more

<sup>68</sup> Laura Petrella from UNHabitat presented on the State of Planning in Africa at the SAPI Planning Africa Conference in 2014. Programme found at:

[http://www.sapi.org.za/sites/default/files/\(SAPI\)%202nd%20Announcement%202014.pdf](http://www.sapi.org.za/sites/default/files/(SAPI)%202nd%20Announcement%202014.pdf)

challenging. The dissertation has illustrated the importance which context plays in determining what each of the TOD principles mean and how they can be achieved.

Dealing with multiple stakeholder interests has been argued to be at the core of overcoming the many barriers which have been reported in TOD experiences. Bringing stakeholders together to collaborate, negotiate and formulate a joint agenda is critically important to TOD success.

The literature on TOD, even when focused on the developing world, remains highly formal in nature. There is very limited literature dealing with how TOD might begin to apply to the informal environments which are expected to persist and grow into the future. There are however some innovative TOD development approaches taking place in informal areas in South America which I argue offer valuable insights for dealing with the dualistic nature of South African cities.

The report argues that it is clear that South African TOD understandings have been influenced by international conceptualisation of the concept. The presence of the TOD term and narrow physical principles have manifested throughout South African policy and strategy documents to varied extents over the past 8 years. However It is evident that even in the case of the City of Johannesburg, which has arguably taken far greater strides in developing the TOD concept than any other South African city, there has been an inability to incorporate lessons from the outcomes of international experiences into the development of detailed context specific strategies.

In South Africa TOD has been identified as an approach to overcoming the extreme socio-spatial inequality inherited from apartheid. Such an understanding places inclusion at the heart of a TOD agenda which arguably demonstrates an interesting adaptation to the conceptual understanding of TOD and something which globally (even in the developing world countries) has not occurred as prominently.

Given the extent to which the TOD concept has evolved and developed internationally beyond merely physical principles it can be argued that the idea of 'internationally accepted principles' as proposed in the National Development Plan should undoubtedly include the deepened and detailed understandings of the challenges and opportunities which have been associated with TOD efforts internationally. These will need to be thought through in the South African context. This provides a view that TOD understandings in South Africa are deficient relative to the vast lessons that have been learnt from TOD application globally. This will have major consequences for the effectiveness of TOD projects moving forward in South Africa.

The stakeholder identification and analysis process has demonstrated the divergence in understandings which exists amongst potentially important TOD stakeholders. Those interviewed were representatives of the municipality, transit agencies, private developers and financiers. In this regard the various perspectives on major barriers differed significantly, even between departments within the municipality but each stakeholder was able to offer an opinion on what the barriers to achieving TOD might be. The barriers ranged from ensuring the quality of public transport service is good to tenants demanding large amounts of parking to planning co-ordination. I argue that this highlights how each of the stakeholders would have an interest in the TOD agenda being driven by the city regardless of their knowledge of the concept. The ability to engage in dialogue and bring various interests together is argued to be critical to

leverage the energy and ability of each of the stakeholders as no single stakeholder can achieve TOD alone.

Even where efforts to realise TOD internationally have been significant it seems that effective TOD remains the exception as opposed to the norm. Often requiring exceptional amounts of divergence from traditional developmental practices and dependant on specialised financial, institutional and political arrangements. It is thus somewhat alarming that South Africa has placed so much of their socio-spatial transformation agenda on the principles which underpin TOD, which have been so incredibly difficult to achieve in other contexts. This arguably demonstrates a misunderstanding of the ability TOD in the short-medium term. What is perhaps more alarming is that there is such a limited understanding of the detailed outcomes and practical challenges associated with achieving TOD in South Africa at least as reflected in policy and strategy, but also when one interrogates the understanding provided by practitioners and other potentially influential stakeholders. While there is evidence that stakeholders' have some sense of these challenges these are neither detailed nor feeding into policy understandings and strategy development. TOD as a specialised tool or special case scenario to achieve socio-spatial transformation is probably very limited. While TOD implementation will require extra-ordinary attention and investment, TOD efforts should be used more strategically to explore ways in which to transform the entire system which governs city wide transport and urban development.

I argue that in Johannesburg the lack of a clear and shared definition of TOD is severely hindering the ability of stakeholders to negotiate and drive a co-ordinated and collaborative effort to realise TOD. The competing interests which have been so well documented in international TOD writing are unsurprisingly present in Johannesburg and likely elsewhere in South Africa. The implication of this is that each of these stakeholders will probably continue to act in siloes and invest in a fragmented manner, undercutting the potential of spatial transformations. International literature is clear that local government is best placed to drive and co-ordinate multiple stakeholder engagement, be the defender of the creation of great places including high quality public realms (as no other stakeholders have incentives to do so) and ensure that they effectively and transparently regulate and approve developments.

There are inherent differences in the manner in which political systems and institutional arrangements operate as well as the way in which land and property markets function across the country relative to other countries. Furthermore given the historical spatial context, the dualistic nature of South African cities arguably calls for a differentiated TOD response in areas displaying different contextual elements. While TOD has largely been used as a tool to combat the adverse effects of the predominant use of the private vehicle in North America, South African cities are also envisioning the concept as a way in which to overcome the deeply entrenched and widespread socio-spatial inequality of apartheid spatial planning.

## 6.2 RECOMMENDATIONS

Given these lessons it is argued that the City of Johannesburg's TOD plans are on the one hand over ambitious whilst on the other perhaps limited in their scope relative to the contextual realities and will struggle to achieve socio-spatial transformation. By this I mean that the idea to target three corridors and provide a highly formalised response to dense, mixed land use, pedestrian prioritisation along the corridors is perhaps a 'stretch too far' initially. By focusing

efforts around a few identified stations and interrogating in detail the contextual realities to inform detailed sets of physical outcomes is perhaps a more strategic approach. Then I argue that there exists the opportunity to experiment with other types of TOD which might begin to expand the TOD thinking beyond the conventional international approach to incorporate TOD around other modes and in poorer areas of the city. These too will require a set of strategically targeted station areas.

There is no doubt that if TOD is to be the prominent socio-spatial restructuring tool which it is being touted as then a carefully considered adaptation is required. Exploring how TOD principles can be achieved in ever growing urban areas of poverty and informality will be critical in this regard. Lessons are on offer from Medellin in Columbia where targeted spatial investment around public transport in high quality social facilities and public realm infrastructure. This has gained much praise in developmental communities globally and interestingly been touted in some circles as a form of TOD.

In light of the findings of the research I am of the view that South African cities need to take a multiple pronged approach to TOD strategy which seeks primarily to drive socio-spatial transformation, including,

- Driving more conventional TOD in areas where land markets provide the demand and private sector interest for TOD potential- this will require identifying a specific set of stations to focus efforts for outcomes. Importantly this might not be around a single mode or modal corridor but might be best placed around stations of multiple modes even if these are not operated by the municipality. Importantly efforts to drive social investment as a condition of these investments must be stronger than is currently exhibited around new development surrounding public transport stations in established and well-functioning land market areas.
- Aligning more closely the efforts of affordable and subsidised housing provision by the state to the principles of TOD to be targeted in areas in close proximity to public transport. Building on Marks and Wilkinson(2007) call for the gap housing market as a strategic car curbing potential, the alignment of other affordable and subsidized housing holds the potential to provide existing public transport users with an improved quality of life. To this end a critical investment focus which needs to accompany such housing investment is a stronger TOD shaping of the private sectors 'township shopping centre' retail investment approach as well as large emphasis placed on investment in the public realm and public facilities such as parks, libraries and recreation centres.
- In areas of informality some of the principles of TOD are already present. A spatially targeted investment strategy which focuses social capital investment in around public transport stations and improves the public realm can lead to an adapted approach to TOD. By investing in the highest quality public facilities these areas begin to become both origins and destinations and can have a major impact on the quality of people's lives. This approach holds much promise for shaping the kind of investment strategies which poorer communities employ to build their own houses and the potential of self-built state supported densification strategies which exhibit stronger TOD principles is worth considering.

I acknowledge that this will require immense amounts of political and financial support and alignment across the multiple stakeholders who will need to be involved in the many different facets of such a strategy. However, if TOD in South Africa is set to become a key driver of socio-spatial transformation then I argue that this is the extent of what might be required and would be a useful point of further debate. Each of these strategies will entail their own respective breaks with current practice. This will require a range of experimentation and demonstration efforts which Bertolini (2012) and Bernstein (2004) call for to advance more sustainable land use transport integration and urban growth in their respective contexts. More research is required in each of these areas to understand in more detail what each of these strategic areas will begin to mean. Furthermore implementation efforts are essential, but need to be focused and carefully consider the land development dynamics which are critical enablers to TOD. At the base of this success is argued to be drawing on and engaging the multiple stakeholders who will be responsible for driving initial implementation efforts, much more intensely, collaboratively and strategically than is currently evident in the Johannesburg case and arguably throughout other cities in South Africa. Experience shows that these implementation efforts will require greater costs, might take longer and will produce less units initially than current approaches to development, however if done properly they hold the potential to exhibit benefits and value. Demonstrating the benefits are important in steering general development practices and availability of resources towards more TOD based products and approaches. To really make the TOD growth agenda impactful however it is important that public transport service and system efficiencies and effectiveness improve dramatically in South Africa because without attractive Transit (T) the orientation of development (OD) will continue to struggle to be integrated.

### 6.3 LIMITATIONS OF THE RESEARCH

I have identified two major limitations of the research which will be acknowledged and briefly discussed. One of the major gaps of the research is engaging with the importance of a high quality integrated public transport system in laying the foundation for TOD. TOD outcomes are heavily impacted by the quality and coverage of the public transport system (Hook, et al, 2013). Important to note is that in many developed world contexts as well as in South American and East Asian cities public transport systems are well operated, integrated and provide relatively extensive and efficient access to many parts of cities. It is thus easier for both public and private sector property investors to back these systems for mobility and accessibility (Banister, 2008; Hook et al, 2013). In South Africa however, while there has been much investment in public transport over the past decade, systems remain highly fragmented, unreliable and offer poor levels of service. There are severe challenges facing the improvement of the entire public transport system which have not been discussed in this research, but without overcoming these issues effective TOD will remain a pipedream. This research takes it as a given that public transport systems operate reliably, in an integrated manner and offer a viable car competitive alternative for travel even in contexts of poverty and informality (which has been central to developing world TOD success). This is not the case, achieving such improvement will require monumental effort from decision makers often involving tough decisions and negotiated trade-offs. One thing is clear in this regard, for TOD to have any chance of moving forward effectively organs of the state across all three spheres will have to break their strong ties with private vehicle based transport departments which are well resourced and remain the dominant



transport investors across cities<sup>69</sup>. More resources and effort needs to be channelled into developing public transport departments equipped with 21<sup>st</sup> century public transport knowledge and skills and the financial backing to design, implement and operate reliable, integrated and safe public transport systems. Until this occurs, private property investment decisions will continue to be based on vehicular access.

The second major limitation surrounds the stakeholder analysis. The sample of stakeholders interviewed is by no means comprehensive. There are many other stakeholders who are integral to achieving effective TOD outcomes and their perspectives have not been represented in this research. Furthermore, the research has highlighted that each stakeholder group is by no means homogenous. As such one might find specific stakeholders in each group which have different understandings and appreciation for TOD will different targets and goals. The research provides an indicative set of insights around viewpoints from a range of potential stakeholders but this cannot be seen as a comprehensive overview of how TOD is being understood by various stakeholders in Johannesburg. There is always the risk that the stakeholders interviewed might not have been the most relevant representative of the stakeholder group (although in most cases these were the people who I was referred to or respondents indicated that they would be relevant respondents). Much research is required around the issue of stakeholder understandings of TOD and how these can be more effectively overcome.

<sup>69</sup> A review of expenditure reporting at municipal, provincial and national level highlight that the vast majority of transport expenditure is allocated to roads investment and maintenance with significantly less allocated to public transport despite significant increases in public transport investment.



## REFERENCES

- Andrews, M. and Fajardo, A. (2014) Does successful governance require heroes? The case of Sergio Fajardo and the city of Medellín: A reform case for instruction. WIDER Working Paper 2014/035, Retrieved, March 20, 2015, from: [http://bsc.cid.harvard.edu/files/bsc/files/wp2014-035\\_1.pdf](http://bsc.cid.harvard.edu/files/bsc/files/wp2014-035_1.pdf).
- Arnstein, S. (1969) A ladder of citizen participation, *Journal of the American Planning Association*, Vol. 35, No. 4: 216-224.
- Banister, D. (2008) The Sustainable Mobility Paradigm, *Transport Policy*, Vol. 15, pp: 73-80.
- Behrens, R. and Wilkinson, P. (2003) Housing and urban passenger transport policy and planning in South African cities: A problematic relationship?, in Harrison P, Huchzermeyer M and Mayekiso M (eds), *Confronting fragmentation: Housing and urban development in a democratising society*, University of Cape Town Press, Cape Town.
- Belzer, D. and Autler, G. (2002) Transit oriented development - moving from rhetoric to reality. Discussion Paper prepared for the Brookings Institution Center on Urban and Metropolitan Policy and the Great American Station Foundation.
- Belzer, D., Autler, G., Espinosa, J., Feigon, S. and Ohland, G. (2004) The Transit-Oriented Development Drama and Its Actors. In Dittmar, H. and Ohland, G. (eds) (2004) *The new transit town: best practices in Transit-Oriented Development*. Island Press: Washington.
- Belzer, D., Hickey, R., Lawson, W., Poticha, S. and Wood, J. (2007) The Case for Mixed-Income Transit-Oriented Development in the Denver Region. Centre for Transit Oriented Development online report, Retrieved, June 15, 2012, from: <http://reconnectingamerica.org/assets/Uploads/enterprise.pdf>.
- Bernstein, S. (2004) The New Transit Town: Great Places and Great Nodes that Work for Everyone. In Dittmar, H. and Ohland, G. (eds) (2004) *The new transit town: best practices in Transit-Oriented Development*. Island Press: Washington.
- Bertaud, A. (2004) The spatial organization of cities Deliberate outcome or unforeseen consequence? Retrieved, August 25, 2013, from: [http://alain-bertaud.com/images/AB The spatial organization of cities Version 3.pdf](http://alain-bertaud.com/images/AB%20The%20spatial%20organization%20of%20cities%20Version%203.pdf).
- Bertolini L. (2012): Integrating Mobility and Urban Development Agendas: A Manifesto. *The Planning Review*, Vol 48, No 1: pp: 16--26.
- Bertolini, L. (1996) Nodes and Places: Complexities of Railway Station Redevelopment. *European Planning Studies*, Vol.4, No. 3, pp: 331-345.
- Bickford, G. (2014a) Transit Oriented Development: An appropriate tool to drive improved access and mobility in South African cities? Conference Paper in South African Cities Network (2014) *Spatial Transformation of Cities: Conference report*. Conference background paper for the Spatial Transformation of Cities conference held in Johannesburg 4-6 March, 2014.



- Bickford, G. (2014b) BRT impacts at a Neighbourhood Level: Insights from Diepkloof. In Transport and Urban Development: Two Studies from Johannesburg. University of the Witwatersrand: Johannesburg.
- Bickford, G. and Behrens, R. (2015) What does Transit Oriented Development Mean in a South African Context? A multiple stakeholder perspective from Johannesburg. Proceedings of the 34<sup>th</sup> South African Transport Conference, Pretoria.
- Blanco, C. and Kobayashi, H. (2009) Urban transformation in slum districts through public space generation and cable transportation at northeastern area: Medellin, Colombia. The Journal of International Social Research. Vol.2, No. 8, pp: 75-90.
- Boyko, C. and Cooper, R. (2011) Clarifying and re-conceptualising density, Progress in Planning. Vol. 76, pp: 1-61.
- Broughton, M., Brill, M. Lee, S., Binger, G. and Cervero, R. (2011) Advancing Bus Rapid Transit and Transit Oriented Corridors in California's Central Valley. Institute of Transportation Studies University of California, Berkeley, working paper UCB-ITS-VWP-2011-3, Retrieved, August 12, 2015, from: <http://www.reconnectingamerica.org/assets/Uploads/UCB-ITS-VWP-2011-3.pdf>.
- Brooks, A. (2010) Weaving Together Vibrant Communities through Transit-Oriented Development, Community Investments, Summer 2010/Volume 22, Issue 2.
- Burgess, R. and Jenks, M. (2002) Compact Cities: Sustainable Urban Forms for Developing Countries. Spon Press: London.
- Campbell, T. (2009) Learning cities: Knowledge, capacity and competitiveness, Habitat International. Vol 33 pp: 195-201.
- Carlton, I. (2007) Histories of Transit-Oriented Development: Perspectives on the Development of the TOD Concept Real Estate and Transit, Urban and Social Movements, Concept Protagonist. Working Paper 2009-02, Institute of Urban and Regional Development, University of California, Berkeley. Retrieved August 5, 2012, from: <http://iurd.berkeley.edu/wp/2009-02.pdf>.
- Carlton, I. and Fleissig, W. (2014) Steps to Avoid Stalled Equitable TOD Projects. Living Cities Online Report. Retrieved, December 14, from: [file:///C:/Users/Geoffrey.SACITIES.001/Downloads/Steps%20to%20Avoid%20Stalled%20Equitable%20TOD%20Projects%20\(1\).pdf](file:///C:/Users/Geoffrey.SACITIES.001/Downloads/Steps%20to%20Avoid%20Stalled%20Equitable%20TOD%20Projects%20(1).pdf).
- Cervero (2001) The Integration of Urban Transport and Urban Planning. In Friere, M. and Stren, R. (eds) The Challenge of Urban Government: Policies and Practices. Washington: World Bank.
- Cervero, R. (1998) The Transit Metropolis: A Global Enquiry. Island Press, Washington.
- Cervero, R. (2013) Bus Rapid Transit (BRT): An Efficient and Competitive Mode of Public Transport. Working Paper 2013-01, Institute of Urban and Regional Development,

- University of California, Berkeley. Retrieved, July 21, 2014, from:  
<http://iurd.berkeley.edu/wp/2013-01.pdf>.
- Cervero, R. and Dai, D. (2014) BRT TOD: Leveraging transit oriented development with bus rapid transit investments. *Transport Policy*, Vol. 36, pp: 127-138.
- Cervero, R. and Guerra, E. (2011) Urban Densities and Transit: A Multi-dimensional Perspective. Institute of Transportation Studies University of California, Berkeley. Retrieved November 17 2014, from:  
<http://www.its.berkeley.edu/publications/UCB/2011/VWP/UCB-ITS-VWP-2011-6.pdf>.
- Cervero, R. and Kang, C. (2011) Bus rapid transit impacts on land uses and land values in Seoul, Korea. *Transport Policy*, Vol. 18, No.1, pp: 102-116.
- Cervero, R. and Murakami, J. (2008) Rail + Property Development: A model of sustainable transit finance and urbanism. Working paper, Berkley University.
- Cervero, R. Murphy, S., Ferrell, C., Goguts, N., Tsai, Y., Arrington, G., Boroski, J., Smith-Heimer, J., Golem, R., Peninger, P., Nakajima, E., Chui, E., Dunphy, R., Myers, M., McKay, S. and Witenstein, N. (2004) *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects*. Transport Research Board, Washington.
- Charles, P. and Hale, C. (2006) Making the Most of Transit Oriented Development Opportunities, Centre for Transport Strategy, UQ –29th Australasian Transport Research Forum Conference, Online report. Retrieved, May 15, 2014, from:  
[http://atrf.info/papers/2006/2006\\_Hale\\_Charles.pdf](http://atrf.info/papers/2006/2006_Hale_Charles.pdf).
- Charlton, S. (2004) An Overview of the Housing Policy and Debates, Particularly in Relation to Women (or Vulnerable Groupings). Centre for the Study of Violence and Reconciliation, Retrieved, August 12, 2015, from:  
<http://www.csvr.org.za/docs/gender/overviewofhousing.pdf>.
- Cheng, V. (2009), Understanding density and high density. In E. Ng (ed.) *Designing high-density cities: for social and environmental sustainability*. London: Earthscan.
- City of Cape Town (2013) Integrated Transport Plan 2013-2018 draft. Retrieved 12 January 2015, from:  
[http://www.capetown.gov.za/en/PublicParticipation/Documents/HYS\\_Transport\\_ITP\\_Final\\_Draft.pdf](http://www.capetown.gov.za/en/PublicParticipation/Documents/HYS_Transport_ITP_Final_Draft.pdf).
- City of Johannesburg (2006) Growth and Development Strategy 2006. Retrieved, October 14, 2014, from: [http://www.joburg-archive.co.za/2006/pdfs/gds\\_book/chapter1.pdf](http://www.joburg-archive.co.za/2006/pdfs/gds_book/chapter1.pdf).
- City of Johannesburg (2008) Integrated Development Plan Revision 2008/09. Retrieved, October 14, 2014, from: [http://www.joburg-archive.co.za/2008/pdfs/budget/v1\\_idp2008\\_ch5.pdf](http://www.joburg-archive.co.za/2008/pdfs/budget/v1_idp2008_ch5.pdf).
- City of Johannesburg (2013) Strategic integrated transport plan framework draft. Retrieved January 12, 2015, from:

<http://www.joburg.org.za/images/stories/2013/June/coj%20sitpf%20part%20a%20for%20comment%20may%202013.pdf>

- City of Johannesburg (2014) Strategic Area Framework for the Empire Perth Development Corridor. Johannesburg Development Agency, Johannesburg. Retrieved, July 20, 2014, from: [http://www.cidforum.co.za/files/EMPIRE\\_PERTH\\_SAF\\_FINAL\\_DRAFT.pdf](http://www.cidforum.co.za/files/EMPIRE_PERTH_SAF_FINAL_DRAFT.pdf).
- City of Johannesburg (n.d) Corridors of Freedom. Retrieved, October 14, 2014, from: [http://www.joburg.org.za/images/pdfs/corridors%20of%20freedom\\_s.pdf](http://www.joburg.org.za/images/pdfs/corridors%20of%20freedom_s.pdf).
- COGTA (Department of Cooperative Governance and Traditional Affairs). (2013) Towards an Integrated Urban Development Framework: A Discussion Document. National Department of Cooperative Governance and Traditional Affairs: Pretoria.
- Cooke, S. and Behrens, R. (2014) A comparative empirical analysis of the relationship between public transport and land use characteristics. Proceedings from the 33rd Southern African Transport Conference, Pretoria.
- Cornwall, A. (2008) Unpacking „Participation“: models, meanings and practices. Community Development Journal, Vol. 43, No. 3, pp: 269-283.
- Crankshaw, O., Gilbert, A., & Morris, A. (2000). Backyard Soweto. International Journal of Urban and Regional Research, Vol. 24, pp: 841–857.
- Currie, G. (2006) Bus Transit Oriented Development— Strengths and Challenges Relative to Rail, Journal of Public Transportation, Vol. 9, No. 4, pp: 1-21.
- Curtis, C. and James, B. (2004) An Institutional Model for Land Use and Transport Integration Urban Policy and Research – Volume 22, Number 3, September 2004 277 – 297
- Curtis, C., Bertolini, L. and Renne, J. (2009) Transit Oriented Development: Making it Happen. Ashgate: Surrey.
- Daisa, J. (2004) Traffic, Parking, and Transit-Oriented Development. In Dittmar, H. and Ohland, G. (eds) (2004) The New Transit Town: best practices in Transit-Oriented Development. Island Press: Washington.
- DBSA (Development Bank of Southern Africa). (2012) The State of South Africa’s Economic Infrastructure: Opportunities and challenges. Development Bank of Southern Africa, South Africa.
- Delhi Development Authority (2012) Transit Oriented Development: Policy. Norms. Guidelines. Delhi Development Authority, New Delhi.
- Department of Human Settlements (2009) The National Housing Code. Retrieved, January 12, from: [http://www.dhs.gov.za/sites/default/files/documents/national\\_housing\\_2009/4\\_Incremental\\_Interventions/5%20Volume%204%20Upgrading%20Infomal%20Settlement.pdf](http://www.dhs.gov.za/sites/default/files/documents/national_housing_2009/4_Incremental_Interventions/5%20Volume%204%20Upgrading%20Infomal%20Settlement.pdf).



- Dittmar and Ohland (2004) *The new transit town: best practices in Transit-Oriented Development*. Island Press: Washington.
- Dittmar and Poticha (2004) *Defining Transit-Oriented Development: The New Regional Building Block*. In Dittmar, H. and Ohland, G. (eds) (2004) *The New Transit Town: best practices in Transit-Oriented Development*. Island Press: Washington.
- Dodson, J., Mees, P., Stone, J. and Burke, M. (2011) *The Principles of Public Transport Network Planning: A review of the emerging literature with select examples*.
- Doherty, M., Nakanishi, H., Bai, X. and Meyers, J. (n.d) *Relationships between form, morphology, density and energy in urban environments*. GEA Background Paper.
- Duffhues et al (2014) *Breaking barriers to transit-oriented development: insights from the serious game SPRINTCITY, Environment and Planning B: Planning and Design*, volume 41, pages 000 – 000
- Echanove, M. (2013) *Beyond the Informal: Reconceptualizing Mumbai's urban development*. MMG Working Paper 13-13, Max Planck Institute for the Study of Religious and Ethnic Diversity. Göttingen. retrieved: May 22 2015, from: [https://www.academia.edu/5994758/Beyond\\_the\\_Informal\\_Reconceptualizing\\_Mumbai\\_is\\_urban\\_development](https://www.academia.edu/5994758/Beyond_the_Informal_Reconceptualizing_Mumbai_is_urban_development).
- Edgill, J., Kroen, A. and Schuerer, J. (2009) *Promoting Transit Oriented Development at the Local Level: The opportunities and Challenges for Local Governments*. Chapter in Curtis, C., Renne, J. and Bertolini, L. (eds) *Transit Oriented Development: Making it Happen*. Ashgate, Surrey.
- Essam, H. and Khalil, E. (2010) *New Urbanism, Smart Growth and Informal Areas: A Quest for Sustainability*, CSAAR Conference 2010, *Sustainable Architecture & Urban Development*, Amman, Jordan, pp: 137-156.
- Ewing, K. (2005) *The design of positive public space as a core public investment in low income housing areas: Examining the possibilities for a market space and infill housing in Khayelitsha, Cape Town*. World Congress on Housing Transforming Housing Environments through Design September 27-30, 2005, Pretoria, South Africa.
- Florida, R. (2013) *Density vs. Livability in the World's Biggest Cities*, Online Article, retrieved: May 22 2015, from: <http://www.citylab.com/work/2013/02/density-vs-livability-worlds-biggest-cities/4511/>.
- Freire, M., Lall, S. and Leipziger, D. (2014) *Africa's Urbanization: Challenges and Opportunities*, The Growth Dialogue-Working Paper No.7, Retrieved January 8, 2015, from: [http://www.growthdialogue.org/sites/default/files/documents/GD\\_WP7\\_web\\_8.5x11%20\(3\).pdf](http://www.growthdialogue.org/sites/default/files/documents/GD_WP7_web_8.5x11%20(3).pdf).
- Gilbert, A., Mabin, A., McCarthy, M. and Watson, V. (1997). *Low-income rental housing: are South African cities different?* *Environment and Urbanisation*, Vol. 9, pp: 133-147.



- Greenberg, E. (2004) Regulations Shape Reality: Zoning for Transit-Oriented Development. In Dittmar, H. and Ohland, G. (eds) (2004) The New Transit Town: best practices in Transit-Oriented Development. Island Press: Washington.
- Grescoe, T. (2012) Straphanger: Saving Our Cities and Ourselves from the Automobile. Harper Perennial: Canada.
- Grey, P. and Behrens, R. (2013) A case for smarter city growth: A strategic analysis of cape town's phase 1a BRT system and its supporting land use Environment. Proceedings from the 32nd South African Transport Conference, Pretoria.
- Harrison, P. (2006) Integrated development plans and third way politics. Democracy and delivery: Urban policy in South Africa, 186-207.
- Harrison, P., Todes, A. and Watson, V. (2008) Planning and Transformation: Learning from the Post-Apartheid Experience. Routledge: Abingdon.
- Harvey, J. and Jowsey, E. (2004) Urban Land Economics (Sixth Edition). Palgrave Macmillan: Basingstoke.
- Healey, P. (1993) Planning Through Debate: The Communicative Turn in Planning Theory. In Fischer, F. and Forester, J. (eds) (1993) The Argumentative Turn in Policy Analysis, UCL Press: London.
- Hendricks, S., Winters, P., Wambalaba, F., Barbeau, S., Catala, M. and Thomas, K. (2005) Impacts of Transit Oriented Development on Public Transportation Ridership Florida: Centre for Urban Transportation Research.
- Hook, W., Lotshaw, S. and Weinstock, A. (2013) More Development For Your Transit Dollar: An Analysis of 21 North American Transit Corridors. Institute for Transportation and Development Policy: New York.
- Hrelja, R. (2015) Integrating transport and land-use planning?: How steering cultures in local authorities affect implementation of integrated public transport and land-use planning. Transportation Research Part A: Policy and Practice, Vol. 74, pp: 1-13.
- Huang, C. and Mehndiratta, S. (2014) Transit-oriented development — What does it take to get it right? Blog post, retrieved December 12, 2014, from: <http://blogs.worldbank.org/transport/transit-oriented-development-what-does-it-take-get-it-right>.
- Huchzermeyer, M. (2004) Informal Settlements and Urban Policy in South Africa and Brazil. Africa World Press: Eritrea.
- Huchzermeyer, M. and Karam, A. (eds.) (2006) Informal Settlements: A Perpetual Challenge? Cape Town: UCT Press.
- ITDP (Institute for Transportation and Development Policy). (2012) Best Practices in Urban Development in the Pearl River Delta. ITDP: China.



- Johannesburg Development Agency (2011) Analysis of the Impact of the JDA's Area-Based Regeneration Projects on Private Sector Investments. Online report, Retrieved, September 26, 2015, from: <http://www.joburg-archive.co.za/2011/inner-city/analysis-private-sector-investment-execsummary.pdf>.
- Lefèvre (2009) Urban Transport Energy Consumption: Determinants and Strategies for its Reduction. S.A.P.I.EN.S [Online], 2.3 | 2009, Online since 15 December 2009, connection on 27 August 2014. URL : <http://sapiens.revues.org/914>.
- Lemont, E. (2014) Key Issues in Financing Mixed-Use Developments, *Probate and Property* , Vol. 28, No. 4.
- Litman, T. (2015) Land Use Impacts on Transport How Land Use Factors Affect Travel Behavior. Victoria Transport Policy Institute. Retrieved September 5, 2015, from: <http://www.vtpi.org/landtravel.pdf>.
- Lombard, M. (2014) Constructing ordinary places: Place-making in urban informal settlements in Mexico. *Progress in Planning*, Vol. 94, pp: 1–53.
- Mang, N. (2015) A Leadership Case Study of Curitiba, Brazil. Online Paper, Retrieved August 5, 2015, from: <http://www.regenesisgroup.com/wp-content/uploads/2015/02/CuritibaCaseStudy.pdf>.
- Markewicz, A., Linders, L. and Moodley, G. (2011) Translating EThekweni's Vision of Compact City into Reality Through Integrated Transportation and Land Use Planning. Proceedings of the 30<sup>th</sup> South African Transport Conference, Pretoria.
- McDonald, S. (2010) Risk in mixed-use property development in South Africa : a case study of Melrose Arch, MBA dissertation, University of Pretoria, Pretoria, Retrieved, July 6 from: <http://upetd.up.ac.za/thesis/available/etd-06092011-092604/>.
- Mees, P. (2010) *Transport for suburbia: Beyond the automobile age*. Earthscan: London.
- Mushongahande, R., Cloete, C. and Venter, C. (2014) Impact of the Gautrain on property development around station precincts *Journal of the South African Institution of Civil Engineering* Vol. 56, No. 1, pp: 2-10.
- Napier, M. and Landman, K. (2010) Waiting for a house or building your own? Reconsidering state provision, aided and unaided self-help in South Africa. *Habitat International*, Vol. 34, pp: 299-305.
- National Treasury (2013) National Governments role in supporting transit oriented development, presentation at Implementing Transit Oriented Development workshop 8 October [http://www.slideshare.net/ReaVaya\\_KM/csp-coj-tod-8-oct-2013-samantha-naidu](http://www.slideshare.net/ReaVaya_KM/csp-coj-tod-8-oct-2013-samantha-naidu).
- Newman, P. and Kenworthy, J. (1996) The Land Use-Transport Connection. *Land Use Policy*, Vol. 13, No. 1, pp: 1-22.

NPC (National Planning Commission). (2011) National Development Plan. National Planning Commission: South Africa.

Pieterse (2014) Johannesburg: Corridors of Freedom, London School of Economics Cities. Retrieved, September 21, 2014, from: <https://lsecities.net/media/objects/articles/johannesburg-corridors-of-freedom/en-gb/>.

Pieterse, E. (2011) Rethinking African Urbanism from the Slum. Urban Age, LSE Cities, London School of Economics, Online report. Retrieved, March 5, 2015, from: <https://lsecities.net/media/objects/articles/rethinking-african-urbanism-from-the-slum/en-gb/>.

Pillay, K. and Seedat, I. (2007) Towards 2020: public transport strategy and action plan. Proceedings of the 26<sup>th</sup> South African Transport Conference, Pretoria.

Pollack, M. and Prater, B. (2013) Filling the Financing Gap for Equitable Transit-Oriented Development: Lessons from Atlanta, Denver, the San Francisco Bay Area and the Twin Cities. Online report, Retrieved, July 16, 2014, from: <http://www.liifund.org/wp-content/uploads/2013/04/TOD-Report-03-26-13-FINAL.pdf>.

Pollock, S., Bluestone, B. and Billingham, C. (2010) Maintaining Diversity In America's Transit-Rich Neighborhoods: Tools for Equitable Neighborhood Change. Online journal. Retrieved, July 21, 2014, from: <https://www.bostonfed.org/commdev/necd/2010/issue1/diversity-transit-rich-neighborhoods.pdf>.

Poticha, S. and Wood, J. (2009) Transit Oriented for All: Delivering Mixed-Income Housing in Transit Served Neighbourhoods. In Curtis, C., Renne, J. and Bertolini, L. (eds) Transit Oriented Development: Making it Happen. Ashgate: Surrey.

Queensland Government (2010) Transit Oriented Development: Guide for practitioners in Queensland. Department of Infrastructure and Planning.

Reed, D. (2014) Cable cars are taking Latin America by a storm. CityMetric, Online Article. Retrieved, October 12, 2015, from: <http://www.citymetric.com/cable-cars-are-taking-latin-america-storm>.

Renne, J. (2005) Transit Oriented Development in Western Australia: Attitudes, Obstacles and Opportunities. Planning and Transport Research Centre.

Renne, J. and Wells, J. (2002) State of the Literature: Transit-Oriented Development. Voorhees Transportation Policy Institute. Retrieved, August 12, 2013, from: [http://www.fltod.com/research/tod\\_planning\\_and\\_fbc\\_outside\\_florida/municipalities/new\\_jersey/state\\_of\\_the\\_literature.pdf](http://www.fltod.com/research/tod_planning_and_fbc_outside_florida/municipalities/new_jersey/state_of_the_literature.pdf).

Roberts, B. (2007) Changes in Urban Density: Its Implications on the Sustainable Development of Australian Cities.



- Rode, P., Floater, G., Thomopoulos, N., Docherty, J., Schwinger, P., Mahendra, A., and Fang, W. (2014): Accessibility in Cities: Transport and Urban Form. NCE Cities Paper 03. LSE Cities. London School of Economics and Political Science.
- Rodriguez, D. and Tovar, E. (2013) Bus Rapid Transit and Urban Development in Latin America, Land Lines, Lincoln Institute of Land Policy.
- Roy, A. (2005) Urban Informality: Toward an Epistemology of Planning. Journal of the American Planning Association, Vol. 71, No. 2, pp: 147-158.
- SACN (South African Cities Network). (2011a) Creating and Capturing Value around Transport Nodes.
- SACN (South African Cities Network). (2011b) State of South African Cities Report. SACN: Johannesburg.
- Shapurjee, Y. and Charlton, S. (2013) Transforming South Africa's low-income housing projects through backyard dwellings: Intersections with households and the State in Alexandra, Johannesburg. Online Paper, Retrieved, August 12, 2015, from: [http://researchspace.csir.co.za/dspace/bitstream/10204/7280/1/Shapurjee\\_2013.pdf](http://researchspace.csir.co.za/dspace/bitstream/10204/7280/1/Shapurjee_2013.pdf).
- Shoup, D. (1997) The high cost of free parking, Journal of Planning Education and Research. Vol. 17, pp: 3-20.
- South African Cities Network (2012) Important legal issues for provincial legislation dealing with Spatial Planning and Land Use Management. SACN: Johannesburg.
- South African Cities Network (2014a) From Housing to Human Settlements: Evolving Perspectives. Johannesburg: SACN.
- South African Cities Network (2014b) How to Build Transit Oriented Cities: Exploring Possibilities. Johannesburg: SACN.
- South African Presidency (2014) Twenty Year Review. National Department of Monitoring and Evaluation: Pretoria.
- Statistics South Africa (2011) Census. Retrieved 21 December 2014, from: <http://www.statssa.gov.za/publications/p03014/p030142011.pdf>.
- StatsSA (2013) National Travel Household Survey Results.
- Steer, T. (2012) Transit Orientated Development and its Application in a South African Context. GAPP Architects & Urban Designers in collaboration with TFP Farrells HK, retrieved June 5, from: <http://www.gapp.net/images/pdf/Transit%20Orientated%20Development.pdf>.
- Sussman, J. and Gilat, M. (2002) Coordinated Transportation and Land Use Planning in the Developing World – The Case of Mexico City. Online report. Retrieved, August 12, 2013, from: <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-212j-an-introduction-to-intelligent-transportation-systems-spring-2005/readings/sussman.pdf>.



- Suzuki, H., Cervero, R. and Iuchi K. (2013) Transforming Cities with Transit: Transit and Land-Use Integration for Sustainable Urban Development. World Bank: Washington DC.
- Suzuki, H., Murakami, J., Hong, Y. and Tamayose, B. (2015) Financing transit-oriented development with land values : adapting land value capture in developing countries. World Bank. Washington DC.
- Tau, P. (2013) 2013 State of The City Address by the Executive Mayor of Johannesburg Clr Mpho Tau. Johannesburg: City of Joburg.
- Todes, A. (2012a) Urban growth and strategic spatial planning in Johannesburg, South Africa, Cities. Vol. 29, No.3, pp:158–165.
- Todes, A. (2012b) New Directions in Spatial Planning? Linking Strategic Spatial Planning and Infrastructure Development, Journal of Planning Education and Research. Vol. 32, No. 4, pp: 400–414.
- Tonkin, A. (2008) Sustainable medium-density housing: A resource book. Development Action Group: Cape Town.
- Transport Research Board (2002) Transit-Oriented Development and Joint Development in the United States: A Literature Review. Transit Cooperative Research Program, Research Results Digest, No. 52. Retrieved January 3, 2015, from: [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rrd\\_52.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_52.pdf).
- Transport Research Board (2004) Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects. Transit cooperative research program (TCRP) Report 102. Retrieved, May 20, 2011, from: [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rpt\\_102.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_102.pdf).
- Turok, I. (2012) Urbanisation and Development in South Africa: Economic Imperatives, Spatial Distortions and Strategic Responses. International institute for environment and development United Nations population fund (IIED UNFPA). Urbanization and Emerging Population Issues working Paper 8.
- UCT (2013) Urban Africa Rising, UCT research report 13/14. Retrieved December 20, 2014, from: <http://research2013.uct.ac.za/wp-content/uploads/2014/07/Urban-Africa-Rising.pdf>.
- UN-Habitat. (2010) State of the world's cities report 2010/11: Bridging the urban divide. Earthscan: London.
- United Nations (2014) UN finds world's population is increasingly urban with more than half living in urban areas today and another 2.5 billion expected by 2050. Press release, United Nations, Retrieved August 11, 2015, from: [http://esa.un.org/unpd/wup/PressRelease/WUP2014\\_PressRelease.pdf](http://esa.un.org/unpd/wup/PressRelease/WUP2014_PressRelease.pdf).



- Urban Land Institute and Centre for Liveable Cities (2013) 10 Principles for Liveable High-Density Cities Lessons from Singapore. Online report. Retrieved, July 21, 2015, from: <http://www.clc.gov.sg/documents/books/10PrinciplesforLiveableHighDensityCitiesLessonsfromSingapore.pdf>.
- Van Wyk, L. (2011) Urban Regeneration and Transportation. Council for Scientific and Industrial Research (CSIR) online report. Retrieved, August 12, 2014 from: [http://researchspace.csir.co.za/dspace/bitstream/10204/4973/1/Van%20Wyk1\\_2011.pdf](http://researchspace.csir.co.za/dspace/bitstream/10204/4973/1/Van%20Wyk1_2011.pdf).
- Venner, M. and Ecola, L. (2007) Financing Transit-Oriented Development Understanding and Overcoming Obstacles. Journal of the Transit Research Board, No. 1996, pp: 17-24.
- Wilkinson, P. (2006) 'Transit Oriented Development': A Strategic Instrument for Spatial Restructuring and Public Transport System Enhancement in South African Cities? Proceedings of the 25<sup>th</sup> South African Transport Conference, Pretoria.
- Wilkinson, P., and Marks, A. (2007) Promoting Transit Oriented Development in the Atlantis Corridor, Cape Town: Towards and Implementable Model. Proceedings of the 26<sup>th</sup> South African Transport Conference, Pretoria.
- Willson, R. (2001) Assessing communicative rationality as a transportation planning paradigm. Transportation, Vol. 28: 1–31.
- Zhang, M., Mulholland, K., Zhang, J. and Gomez-Sanchez, A. (2012) Getting the Parking Right for Transit-Oriented Development. Center for Transportation Research University of Texas at Austin. Retrieved August 11 2015, from: <http://metro.kingcounty.gov/programs-projects/right-size-parking/pdf/getting-the-parking-right-transit-oriented-development.pdf>.



## LIST OF ACRONYMS

|        |                                                       |
|--------|-------------------------------------------------------|
| BEPP   | BUILT ENVIRONMENT PERFORMANCE PLAN                    |
| BNG    | BREAKING NEW GROUND                                   |
| BRT    | BUS RAPID TRANSIT                                     |
| CSP    | CITY SUPPORT PROGRAMME                                |
| ERC    | ETHIOPIAN RAIL CORPORATION                            |
| FAR    | FLOOR AREA RATIO                                      |
| GIS    | GEOGRAPHICAL INFORMATION SYSTEMS                      |
| GMS    | GROWTH MANAGEMENT STRATEGY                            |
| IDP    | INTEGRATED DEVELOPMENT PLAN                           |
| IPC    | INTERGOVERNMENTAL PLANNING COMMITTEE                  |
| IRD    | INTEGRATED RESIDENTIAL DEVELOPMENT PROGRAMME          |
| IRPTN  | INTEGRATED RAPID PUBLIC TRANSPORT NETWORKS            |
| ITMP   | INTEGRATED TRANSPORT MASTER PLAN 2055                 |
| ITP    | INTEGRATED TRANSPORT PLAN                             |
| JDA    | JOHANNESBURG DEVELOPMENT AGENCY                       |
| LEM    | LOCATION EFFICIENT MORTGAGES                          |
| NAMA   | NATIONALLY APPROPRIATE MITIGATION ACTIONS             |
| NDP    | NATIONAL DEVELOPMENT PLAN                             |
| NHTS   | NATIONAL HOUSEHOLD TRAVEL SURVEY                      |
| NMT    | NON-MOTORISED TRANSPORT                               |
| NT     | NATIONAL TREASURY                                     |
| NTNDP  | NATIONAL TREASURY NEIGHBOURHOOD DEVELOPMENT PROGRAMME |
| PRASA  | PASSENGER RAIL AGENCY OF SOUTH AFRICA                 |
| PTISG  | PUBLIC TRANSPORT INFRASTRUCTURE AND SYSTEMS GRANT     |
| RDP    | RECONSTRUCTION AND DEVELOPMENT PROGRAMME              |
| SAF    | STRATEGIC AREA FRAMEWORK                              |
| SDF    | SPATIAL DEVELOPMENT FRAMEWORK                         |
| SHS    | SUSTAINABLE HUMAN SETTLEMENTS                         |
| SPLUMA | SPATIAL PLANNING AND LAND USE MANAGEMENT ACT          |
| TAD    | TRANSIT ADJACENT DEVELOPMENT                          |
| TDM    | TRAVEL DEMAND MANAGEMENT                              |
| TOD    | TRANSIT-ORIENTED DEVELOPMENT                          |
| UDB    | URBAN DEVELOPMENT BOUNDARY                            |
| UN     | UNITED NATIONS                                        |



# ANNEXURES

## ANNEXURE A- ETHICS CLEARANCE FORM AND INTERVIEW LETTER

### 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](mailto: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: Geoffrey Bickford Department: CIVIL ENGINEERING

Preferred email address of the applicant:

If a Student: Degree: MPhil Transport Studies Supervisor: Prof. Roger Behrens

If a Research Contract indicate source of funding/sponsorship:

Research Project Title: Transit Oriented Development in A South African Context: An analytical review of Johannesburgs recent urban policy & Strategy

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 | NO |
| Question 2: Is your research making use of human subjects as sources of data?<br>If your answer is YES, please complete Addendum 2.                        | YES | NO |
| Question 3: Does your research involve the participation of or provision of services to communities?<br>If your answer is YES, please complete Addendum 3. | YES | NO |
| Question 4: If your research is sponsored, is there any potential for conflicts of interest?<br>If your answer is YES, please complete Addendum 4.         | YES | NO |

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:

|                                                                                                                                       | Full name and signature  | Date               |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|
| Principal Researcher/Student:                                                                                                         | <u>Geoffrey Bickford</u> | <u>28/02/2014</u>  |
| This application is approved by:                                                                                                      |                          |                    |
| Supervisor (if applicable):                                                                                                           | <u>R. BEHRENS</u>        | <u>24 MAR 2014</u> |
| HOD (or delegated nominee):<br>Final authority for all assessments with NO to all questions and for all undergraduate research.       |                          |                    |
| Chair: Faculty EIR Committee<br>For applicants other than undergraduate students who have answered YES to any of the above questions. |                          | <u>25/01/2014</u>  |

# Covering letter

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## Request for an interview to contribute to a transport studies Masters Dissertation

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## ANNEXURE B- SUMMARY TABLE OF TOD INCLUSION IN MUNICIPAL AND PROVINCIAL PLANS

| City/Province           | Document   | Year | TOD inclusion | How So | Land use transport integration |
|-------------------------|------------|------|---------------|--------|--------------------------------|
| Western Cape / Wes-Kaap | 504100 L5t |      | Not included  |        | Not included                   |
| Western Cape / Wes-Kaap | L5t        |      | Not included  |        | Not included                   |
| Western Cape / Wes-Kaap | L5t        |      | Not included  |        | Not included                   |

| City/Province | Document            | Year | TOD inclusion                                                                                                                                                                                                                                                                            | How So                                                                                                                                                                                                                                                                                                                                                                 | Land use transport integration |
|---------------|---------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| / 4m\$ E0XQ   | 5o400 LEt           |      | <p>SS04P P Eh5 00040\$ 4</p> <p>o\$0000000 000\$ 00 0'1\$</p> <p>0000 4004000\$ Eh5</p> <p>0'100000° 00 4 004000°</p> <p>000000000 00 040\$ 000</p> <p>000 000000000 0'1\$</p> <p>45t [0000 00000000000</p> <p>00 00400000 0000000</p> <p>00000000000 Eh5 0000</p> <p>40 45a 0000000</p> | <p>0000400 Eh5 0'1000000 000000000 000</p> <p>0000 4 0000 0000'100 400000°</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> <p>000000 00 040\$ 00 0'1\$ 0000000</p> |                                |
| 90'100'10000  | 5000000000000000000 |      | <p>0000000000000000000</p> <p>00000000° 0000 00000000000</p> <p>000000° 0000 00000000000</p> <p>0000000000000000000</p> <p>0000000000000000000</p> <p>0000000000000000000</p> <p>0000000000000000000</p>                                                                                 | <p>000000 Eh5 00 0'10° 100 000000000 0'100000°</p>                                                                                                                                                                                                                                                                                                                     |                                |
| 90'100'10000  | 45t                 |      | <p>Eh5 0000000 40 4 0000</p> <p>0000000000000000000</p> <p>0000000000000000000</p> <p>0'1\$ 000000° 0000 400</p> <p>0000 0000000000000000000</p> <p>0'10 0000000000000000000</p> <p>0000000000000000000</p> <p>0'10° 100 0000000000000000000</p>                                         | <p>000 0000'100 000000000 000 Eh5 0000000000000000000</p> <p>000 000000000 0'10° 000 400 0000000000000</p>                                                                                                                                                                                                                                                             |                                |

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[illegible]

| City/Province | Document                   | Year | TOD inclusion                                                                                                                                                               | How So                                                                                                                                                                                            | Land use transport integration |
|---------------|----------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Wu'itong      | suburban road network plan |      | the plan includes the construction of a new road network in the suburban area, which will improve the road conditions and reduce the traffic congestion in the city center. | the plan is based on the current road network and the future development of the suburban area. It takes into account the needs of the residents and the government's policy on urban development. |                                |
| Wu'itong      | suburban road network plan |      | the plan includes the construction of a new road network in the suburban area, which will improve the road conditions and reduce the traffic congestion in the city center. | the plan is based on the current road network and the future development of the suburban area. It takes into account the needs of the residents and the government's policy on urban development. |                                |
| Wu'itong      | suburban road network plan |      | the plan includes the construction of a new road network in the suburban area, which will improve the road conditions and reduce the traffic congestion in the city center. | the plan is based on the current road network and the future development of the suburban area. It takes into account the needs of the residents and the government's policy on urban development. |                                |
| Wu'itong      | suburban road network plan |      | the plan includes the construction of a new road network in the suburban area, which will improve the road conditions and reduce the traffic congestion in the city center. | the plan is based on the current road network and the future development of the suburban area. It takes into account the needs of the residents and the government's policy on urban development. |                                |

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| City/Province | Document                                     | Year | TOD inclusion                        | How So                                                                                                                                                                       | Land use transport integration |
|---------------|----------------------------------------------|------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Delft         | Delft 2011<br>a 10% increase<br>in transport |      | Inclusion of transport<br>in the TOD | Transport is a key element of the TOD and should be integrated into the overall planning process. The TOD should be designed to support the transport system and vice versa. |                                |
| Delft         | Delft 2011<br>a 10% increase<br>in transport |      | Inclusion of transport<br>in the TOD | Transport is a key element of the TOD and should be integrated into the overall planning process. The TOD should be designed to support the transport system and vice versa. |                                |



## ANNEXURE C- COMPILATION AND SUMMARY OF STAKEHOLDER INTERVIEW RESPONSES

[illegible]

[illegible]

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[illegible]

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   38. 2060-2061<br/>         39. 2061-2062<br/>         40. 2062-2063<br/>         41. 2063-2064<br/>         42. 2064-2065<br/>         43. 2065-2066<br/>         44. 2066-2067<br/>         45. 2067-2068<br/>         46. 2068-2069<br/>         47. 2069-2070<br/>         48. 2070-2071<br/>         49. 2071-2072<br/>         50. 2072-2073<br/>         51. 2073-2074<br/>         52. 2074-2075<br/>         53. 2075-2076<br/>         54. 2076-2077<br/>         55. 2077-2078<br/>         56. 2078-2079<br/>         57. 2079-2080<br/>         58. 2080-2081<br/>         59. 2081-2082<br/>         60. 2082-2083<br/>         61. 2083-2084<br/>         62. 2084-2085<br/>         63. 2085-2086<br/>         64. 2086-2087<br/>         65. 2087-2088<br/>         66. 2088-2089<br/>         67. 2089-2090<br/>         68. 2090-2091<br/>         69. 2091-2092<br/>         70. 2092-2093<br/>         71. 2093-2094<br/>         72. 2094-2095<br/>         73. 2095-2096<br/>         74. 2096-2097<br/>         75. 2097-2098<br/>         76. 2098-2099<br/>         77. 2099-2100<br/>         78. 2100-2101<br/>         79. 2101-2102<br/>         80. 2102-2103<br/>         81. 2103-2104<br/>         82. 2104-2105<br/>         83. 2105-2106<br/>         84. 2106-2107<br/>         85. 2107-2108<br/>         86. 2108-2109<br/>         87. 2109-2110<br/>         88. 2110-2111<br/>         89. 2111-2112<br/>         90. 2112-2113<br/>         91. 2113-2114<br/>         92. 2114-2115<br/>         93. 2115-2116<br/>         94. 2116-2117<br/>         95. 2117-2118<br/>         96. 2118-2119<br/>         97. 2119-2120<br/>         98. 2120-2121<br/>         99. 2121-2122<br/>         100. 2122-2123<br/>         101. 2123-2124<br/>         102. 2124-2125<br/>         103. 2125-2126<br/>         104. 2126-2127<br/>         105. 2127-2128<br/>         106. 2128-2129<br/>         107. 2129-2130<br/>         108. 2130-2131<br/>         109. 2131-2132<br/>         110. 2132-2133<br/>         111. 2133-2134<br/>         112. 2134-2135<br/>         113. 2135-2136<br/>         114. 2136-2137<br/>         115. 2137-2138<br/>         116. 2138-2139<br/>         117. 2139-2140<br/>         118. 2140-2141<br/>         119. 2141-2142<br/>         120. 2142-2143<br/>         121. 2143-2144<br/>         122. 2144-2145<br/>         123. 2145-2146<br/>         124. 2146-2147<br/>         125. 2147-2148<br/>         126. 2148-2149<br/>         127. 2149-2150<br/>         128. 2150-2151<br/>         129. 2151-2152<br/>         130. 2152-2153<br/>         131. 2153-2154<br/>         132. 2154-2155<br/>         133. 2155-2156<br/>         134. 2156-2157<br/>         135. 2157-2158<br/>         136. 2158-2159<br/>         137. 2159-2160<br/>         138. 2160-2161<br/>         139. 2161-2162<br/>         140. 2162-2163<br/>         141. 2163-2164<br/>         142. 2164-2165<br/>         143. 2165-2166<br/>         144. 2166-2167<br/>         145. 2167-2168<br/>         146. 2168-2169<br/>       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2417-2418<br/>         396. 2418-2419<br/>         397. 2419-2420<br/>         398. 2420-2421<br/>         399. 2421-2422<br/>         400. 2422-2423<br/>         401. 2423-2424<br/>         402. 2424-2425<br/>         403. 2425-2426<br/>         404. 2426-2427<br/>         405. 2427-2428<br/>         406. 2428-2429<br/>         407. 2429-2430<br/>         408. 2430-2431<br/>         409. 2431-2432<br/>         410. 2432-2433<br/>         411. 2433-2434<br/>         412. 2434-2435<br/>         413. 2435-2436<br/>         414. 2436-2437<br/>         415. 2437-2438<br/>         416. 2438-2439<br/>         417. 2439-2440<br/>         418. 2440-2441<br/>         419. 2441-2442<br/>         420. 2442-2443<br/>         421. 2443-2444<br/>         422. 2444-2445<br/>         423. 2445-2446<br/>         424. 2446-2447<br/>         425. 2447-2448<br/>         426. 2448-2449<br/>         427. 2449-2450<br/>         428. 2450-2451<br/>         429. 2451-2452<br/>         430. 2452-2453<br/>       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2488-2489<br/>         467. 2489-2490<br/>         468. 2490-2491<br/>         469. 2491-2492<br/>         470. 2492-2493<br/>         471. 2493-2494<br/>         472. 2494-2495<br/>         473. 2495-2496<br/>         474. 2496-2497<br/>         475. 2497-2498<br/>         476. 2498-2499<br/>         477. 2499-2500<br/>         478. 2500-2501<br/>         479. 2501-2502<br/>         480. 2502-2503<br/>         481. 2503-2504<br/>         482. 2504-2505<br/>         483. 2505-2506<br/>         484. 2506-2507<br/>         485. 2507-2508<br/>         486. 2508-2509<br/>         487. 2509-2510<br/>         488. 2510-2511<br/>         489. 2511-2512<br/>         490. 2512-2513<br/>         491. 2513-2514<br/>         492. 2514-2515<br/>         493. 2515-2516<br/>         494. 2516-2517<br/>         495. 2517-2518<br/>         496. 2518-2519<br/>         497. 2519-2520<br/>         498. 2520-2521<br/>         499. 2521-2522<br/>         500. 2522-2523<br/>         501. 2523-2524<br/>       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