A Place-Based Approach to Spatial Transformation: A Case Study of Transit Oriented Development (TOD), Johannesburg

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Abstract

The Transit Oriented Development (TOD) model is increasingly gaining momentum and becoming widely adopted by many cities in addressing a wide range of spatial development challenges within their communities. Development of this nature advocates for a return to a city form that is compact, higher in density, and supported by strategic nodes that promote public transit ridership and non-motorized transport options over auto use. These elements fundamentally constitute the building blocks of TOD. In the wake of this increasing global awareness for TOD, this paper presents empirical findings of TOD perceptions in three nodal areas located along the Louis Botha development corridor in City of Johannesburg (COJ).

Premised on a mixed methods approach, the paper provides an insight into current development typologies in the said corridor while equally interrogating the perceptions of residents toward TOD planning and implementation thereof. The paper also deliberates on the nexus between TOD and place making, out of which a mutually inclusive relationship is established. While the findings of this study reflect a rather poor public awareness of TOD and place making, several other points have been identified. Continued revitalisation programs and design improvements are required. Also, issues of parking planning and management will ultimately require a renewed focus in light of the anticipated Bus Rapid Transit System (BRTS) service along Louis Botha corridor. The paper culminates in the formulation of a set of TOD key determinants derived from the data analysis exercise. Though not necessarily intended to be standard reference points, the paper emphasizes the importance of these determinants in corridor oriented development.

Keywords: Transit Oriented Development (TOD), Place-Making, Spatial Transformation, Corridor Development, Production of Social Space, Public Transit.

1. INTRODUCTION

Johannesburg, located in the heart of the province of Gauteng, is South Africa's wealthiest city. Widely known as Joburg or Jozi, it is the focal point for economic activity and boasts strong African and global links. Todes (2012:159) enunciates that it accounts for 13.7% of national output. Population figures from the latest national census (2011) reflect a total of 4 434 827 residents and a population density of 2696 people/km² (StatsSA, 2012). Established in 2002 after an agglomeration of a number of former local authorities, it is the largest metropolitan municipality in the country.

In spite of its vivid profile, the municipality remains confronted by a plethora of spatial development challenges. The spatial legacy of apartheid continues to manifest itself in many different ways across various communities. Consequently, the municipality has in recent years formulated a number of frameworks and strategies aimed at not only addressing its spatial and socio-economic imbalances, but

also charting a sustainable developmental path for the medium to long term. The Spatial Development Framework (SDF), revised in a periodic cycle of three years, embodies the spatial vision of the municipality and captures the essence of how this vision will be achieved. Various other strategies such as the '2010 Growth Management Strategy (GMS)' and 'Growth and Development Strategy (GMS) 2040' reflect the municipality's commitment towards progressive spatial transformation and thwarting socio-economic barriers and inequalities. "These objectives are unpacked into strategies emphasising an efficient movement system, with a focus on public transport; promotion of mixed use nodes and corridors linked to public transport; strategic densification, particularly around these areas of focus, among others" (COJ, 2008 in Alison Todes, 2012:162).

As part of its attempts toward attaining these objectives, the municipality has embarked on a new spatial vision: 'The Corridors of Freedom'. The concept was introduced in May 2013 by Executive Mayor Mpho Parks Tau in his State of the City Address and has since become a mantra. These particular corridors are envisaged to be "…well-planned transport arteries linked to interchanges where the focus will be on mixed-use development – high-density accommodation, supported by office buildings, retail development and opportunities for leisure and recreation" (COJ, 2013). Central to achieving these imperatives is Transit Oriented Development (TOD). Although a relatively new concept in the context of South Africa, the benefits of adopting a TOD approach in spatial transformation are well documented. Its nexus to place-making has equally become an area of active research in the planning field. The central theme of this paper is premised on these two concepts.

2. LITERATURE REVIEW

2.1 Spatial transformation

The Oxford dictionary defines transformation as "A marked change in form, nature, or appearance". Over the years, the interpretation of this term has developed to embody various other overlapping terms such as "'transition', 'change', 'innovation', 'evolution', 'revolution', 'breakthrough', etc. (Yan Yang, 2010:26). What is central to the process of transformation nonetheless is the notion of change; manifesting itself through a number of dimensions. In view thereof, spatial transformation has been used to describe a structural change of a city in terms of its demographic, social, and spatial structures as a result of industrialisation, globalisation, and urbanisation processes (ibid:4).

In the South African context, the spatial configuration of settlements was previously influenced by apartheid planning legislation. However, planning at that point in time was premised on legislation that discriminated along racial lines. Through the Group Areas Act, "Everyone was to be officially classified into racial groups, and all would have to live in areas specifically set aside for the exclusive occupation of a legally defined group" (Christopher, 1992:571). This was essentially apartheid's organising principle which consequently shaped the structure of South Africa's cities. As asserted by Schensul and Heller (2010:1), "it is widely acknowledged in urban sociology that space reflects and reinforces inequality and nowhere is this more obviously true and trenchant than in South Africa". The eradication of apartheid in the dawn of democracy in 1994 impelled a number of strategic interventions by governing authorities to address and redress these spatial development challenges. This has manifested mainly through various legislative measures and policy initiatives to facilitate and expedite the elimination of structural effects of colonial planning of more than 300 years (Williams, 2000:178). Consequently, the concept "transformation" has become central to social change in South Africa (ibid:168). Underpinning this transformation is a;

> "…vision of a non-racial, non-sexist, democratic spatial order where different forms of geographic space, socialized through a specific configuration of social relations/experiences of work, residence, recreation and cultural heritage, amongst others, are readily accessible to most citizens (RSA, 1998 in Williams, 2000:169).

Nonetheless, undoing the effects of decades of spatial inequality and colonization will not be an easy enterprise. According to Schensul and Heller (2010:3), spatial fragmentation and social polarization have continued to increase despite sustained efforts to counter spatial inequalities in

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post-apartheid South Africa. Urban sprawl is also on the increase, perpetuated by decentralization, deindustrialization, suburbanization and greenfield developments which extend and even heighten historical inequalities, marked at one extreme by high-end gated neighborhoods, and distant informal settlements at the other (ibid:3). In the viewpoint of Bremner (2000) and Harrison et al. (2003) all cited in Schensul and Heller (2010:3), the local government has also not been entirely effective in the promotion of racial or economic desegregation. The argument being that the provision of affordable housing through green developments on the periphery has actually exacerbated the apartheid spatial form and reinforced racial exclusion (Schensul and Heller, 2010:3).

Drawing conclusions from the above, conventional approaches in remedying the spatial legacy of apartheid have not been entirely effective in fostering sustainable spatial transformation. This, coupled with the inefficiency of many local governments, has consequently exacerbated the current realities of spatial inequalities and equally prompted for novel and pragmatic approaches that are more sustainable in the long run. In recent years, there has been an increasing interest in the Transit Oriented Development (TOD) model as the possible course of action going forward. A growing number of literature and practice also demonstrates the social, economic, and environmental benefits of adopting TODs within cities.

2.2 Transit Oriented Development (TOD)

Through his book 'The Next American Metropolis; Ecology, Community, and the American Dream (1993)', Peter Calthorpe laid the first foundations for what has become one of the most influential concepts in urban planning theories: Transit Oriented Development (TOD). Its adoption has manifested as a sustained effort aimed at addressing a number of challenges emanating from auto-oriented developments; challenges of which include traffic congestion, increased automobile usage, greenhouse gas emissions, and inadequate access to public transit (Calthorpe, 1993; Dorsey and Mulder, 2013). Essentially, TODs are "…higher density mixed use residential and commercial developments set within walking distance of key transit nodes such as rail or bus stations or around activity centres such as major shopping centres/offices (Bhishna et al., 2005:2). In view, the main objective of TOD is to encourage a modal shift from auto usage to more sustainable forms of transport such as public transit and non-motorised options such as walking and cycling.

Also central to the process of TOD is the integration of transport and urban development (land use). In so doing, it is envisaged that new development would thus be "located where everyone can access services or facilities on foot, bicycle or public transport" (Office of the Deputy Prime Minister, 2005 in Curtis, 2012:83). This integration is one of the most promising means of reversing the trend of automobile-dependent sprawl and placing cities in developing countries on a sustainable pathway (Suzuki et al., 2013).

2.3 The six "Ds"

In TOD, the 'D' variables are considered very crucial in planning and implementation. The paper discusses the six 'D' variables namely: Density, Diversity, Design, Destination Accessibility, Distance to Transit, and Demand Management. Bernick and Cervero (1996) pioneered the first three "Ds", namely, 'Density, Design, and Diversity'. With growing complexities in urban systems over the course of time, three more Ds have gradually been added to address contemporary urban transport in cities.

2.3.1 Density

Santos et al. (2010) assert that density is recognized as a fundamental aspect in developing sustainable transport due to its effect on a number of factors. Basically, density refers to the number or concentration of opportunities per square kilometre or another surface indicator, such as dwellings, households, people and jobs (Van Wee, 2002). In view, thereof, higher

densities translate to higher concentrations of opportunities per given area. As noted by Kenworthy and Laube (1996:281), "high densities tend to be associated with lower average trip distances for all modes, improved public transport through higher potential patronage around each stop and in particular, enhanced viability of walking and cycling".

2.3.2 Diversity

Diversity refers to the mix of various land uses, the degree to which these uses are balanced, as well as the variety of housing types and mobility options available (Suzuki et al., 2013:175). A diversified city in this context is thus "mixed in income, mixed in use, and actively supportive of places that commingle people of different races, ethnicities, genders, ages, occupations, and households" (Talen, 2006:234). According to Jane Jacobs (1961:161-164) in Montgomery (1999), there are two dimensions to diversity in relation to land uses;

- Primary uses: these act as 'people attractors' since they bring people to specific places. Examples include offices, residences, places of learning, recreation etc. The primary objective would be to integrate all these uses in a single node. Strategic nodes should be identified where city features are concentrated and high density, mixed land-use developments are clustered, especially those that provide a service to the community
- Secondary uses: these are more of complementary enterprises and services that grow in response to primary uses (Montgomery, 1998).

2.3.3 Design

Design includes "carefully articulated land-use mixtures; safe and smooth accessibility to transit stations (enabled by foot paths, cycle paths, and street lights, for example); and amenities such as benches, parks, landscaping, and libraries – which all contribute to the development of a good built environment" (Suzuki et al., 2013:39). The design of neighbourhoods can also play a role in developing a model of sustainable mobility for cities, by allowing a key role for walking and cycling through appropriate planning and design (Santos et al., 2010).

2.3.4 Distance

It refers to the distance that a commuter has to walk to the transit station. As noted by Suzuki et al., 2013, cities designed to reduce travel distances encourage walking, cycling, and use of the public transit system. "Cities of short distances" are also cities with lower levels of air pollution, energy consumption, and carbon emissions. In the long term, efficient urban form makes cities more economically competitive and environmentally sustainable. It also helps build social capital by allowing people from all walks of life to come into regular, day-to-day contact with one another (Suzuki et al., 2013).

2.3.5 Destination accessibility

Essentially refers to the ease of traveling from one place to another (Cervero and Seskin 1995). The vision of destination accessibility focuses primarily on the introduction of rapid buses as opposed to orienting land-use activities to the busway. "Improved accessibility is to be achieved by moving people around the city more swiftly, not by bringing urban activities closer together" (Suzuki et al., 2013). BRT has been demonstrated to provide efficient and effective public transport that can even increase transit ridership and attractiveness within defined urban corridors in both developing and developed countries (Wirasinghe et al., 2013).

2.3.6 Demand management

"Demand Management can be defined as any activity, method or program that reduces vehicle trips, resulting in more efficient use of transportation resources" (Dorsey, 2005 in Rahman and

Al-Ahmadi, 2010:174). According to Zhao et al., (2008:584), travel demand strategies include putting more people into fewer vehicles "(through ridesharing, increased public transportation ridership, or dedicated highway lanes for high-occupancy vehicles), shifting the time of travel (e.g., through staggered work hours), and eliminating the need for travel altogether (e.g., through telecommuting)".

There is however a number of obstacles that can impede the successful planning and execution of TODs. As noted by Dorsey and Mulder (2013), the influence of TOD on revitalisation is not always guaranteed, and neither is its planning and implementation straightforward. Conflict of interests can also obstruct the process of TOD. In the context of current planning approaches in which development is driven largely by private interests while the local government sets the rules of the game in terms of zoning and land use regulations, a great deal of cooperation and coordination between all stakeholders cannot be emphasised enough.

To this end, working towards the implementation of a TOD strategy needs to be envisioned though a regional lens and planned at the municipal level. Against this, TOD planning must be cast in a context that provides opportunities to cater to a wide audience of beneficiaries in terms of housing preferences, socio-economic development, high quality living environments, and public transit, among others.

2.4 Place making

Fundamental to Transit Oriented Development is the notion of 'place making'. Dorsey and Mulder (2013:65) capture this quite eloquently, "The vision of a place can influence transit decisions, just as transit literally impacts the shape, flow, and interactions within a place". The place-making concept can be traced back to ideas of rethinking city spaces, such as the need for increased vitality in the central part of a city, or greater ''eyes on the streets'' as articulated by sociologist Jane Jacobs (1961 in Dorsey and Mulder, 2013:65). (Pierce, et al. 2011:54) define place making as "…the set of social, political and material processes by which people iteratively create and recreate the experienced geographies in which they live". Place-making is also the process of appropriating space in order to create a 'mirror of self' (Cooper Marcus, 1995: Friedmann, 2007:259 in Lombard, 2014). The quote below captures the essence of how Relph (1976:i in Lombard, 2014:12) encapsulates place-making as a 'mirror of self',

> "distinctive and diverse places are manifestations of a deeply felt involvement for those places by the people who live in them, and…for many such a profound attachment to place is as necessary and significant as a close relationship with other people."

In view, thereof, there are essentially three elements that characterise successful urban places, namely, physical space, the sensory experience, and activity (Montgomery, 1999:95). In his book 'The Production of Space' (1974/1991) Henri Lefebvre adopts a conceptual triad in explaining how these elements influence the social production of space. He distinguishes between spatial practice, representations of space, and representational space as discussed below.

2.4.1 Spatial Practice

Encompasses social production as well as reproduction and the specific locations and spatial forms that characterize a particular social formation (Simonsen, 2005:524). In the viewpoint of Merrifield (1993:524), spatial practices "…secrete a society's space...and ultimately structure daily life and a broader urban reality." This is perceived space and refers to concrete spaces encountered in the everyday life. Typical examples would thus primarily include such aspects as the urban fabric or form and land use zones.

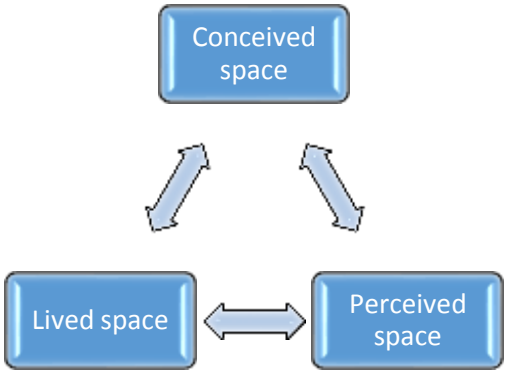
2.4.2 Representations of space

Denotes a society's knowledge of space and conceptual imaginations of space. It is thus conceived space which denotes mental constructions of space, creative ideas about and representations of space (Purcell, 2002). Professionals such as Planners and Engineers, in particular, are at the forefront in the conceptualization and construction of this space.

2.4.3 Representational Space

More or a less a combination of the other two triad elements discussed above. Carp (2008:135) captures it quite well "…it infuses both physical space and mental space; it is something else but never distinctly so." This space is lived and ultimately influences an individual's experiences of space in the everyday life.

The three elements are mutually inclusive and collectively influence the production of space and experiences of the everyday life.



Adapted from Carp, 2008

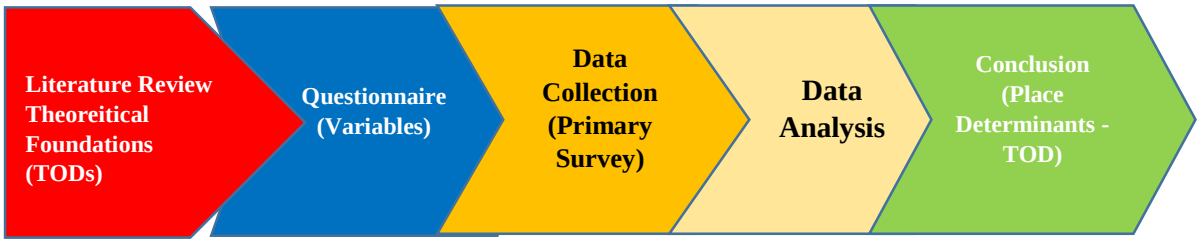
The purpose of this review was to provide a theoretical underpinning for the study. The review alluded to the importance of TOD in spatial transformation processes within transit areas in particular. The subsequent section established a nexus between TOD and place making. The review indicated that these concepts are interconnected and influence each other. In as much as transit decisions influence the shape of a place, so does the shape of a place on transit decisions. Based on the discussion above, the diagram below identifies a number of elements that are central to place making.

3. OBJECTIVES /RESEARCH QUESTIONS

The key aim of the present study is to investigate place making determinants for Transit Oriented Development. An important consideration of this study is cognisance of the fact that these nodes are already in a saturated state of development, making it a rather challenging and contentious task to implement TOD thereof in contrast to starting on empty land. The paper thus seeks to establish the perceptions of residents regarding the implementation of TOD, culminating in the selection of key-determinant indicators in the said corridor.

4. APPROACH & METHODOLOGY

The use of relevant research approaches and methods is justified by the research objectives at hand. In light of the overall objective of this study, i.e., to establish public perceptions of TOD and determinants thereof – the study adopts a mixed methods approach. Sale et al. (2002:44) state that combining qualitative and quantitative methods in a single study is widely practiced and accepted in many areas of research. The study employs a qualitative case study approach while the quantitative dimension finds expression in the orally administered questionnaire. The diagram below illustrates the phasing and overall framework that was adopted in carrying out the study.



4.2 Questionnaire design

The heart of a survey is its questionnaire (Krosnick and Presser 2010:263). In this study, a structured and orally administered questionnaire was used. The format of the questionnaire consisted of four structured sections which comprised of close ended type of responses. The first section consisted of questions aimed at profiling the demographic details of respondents. Section two is the crux of this study and was divided into six sub-sections, which were informed by the 6Ds of TOD. The last section of the questionnaire required survey participants to score and rank the

relevance of specific themes for each "D" variable. Personal contact details of respondents were not solicited.

4.3 Data collection and analysis

A questionnaire was used for data collection. Bird (2009:1307) citing Bulmer (2004) asserts that a questionnaire is "a well-established tool within social science research for acquiring information on participant social characteristics, present and past behaviour, standards of behaviour or attitudes and their beliefs and reasons for action with respect to the topic under investigation." Questionnaires surveys were thus undertaken in the relevant study areas whereby respondents were randomly approached (convenience sampling) in person and asked to participate in the survey. Observations were also employed and the technique used thereof were photographs. The sample size (24 respondents) for this study was drawn from community members within the respective nodes. With regard to data analysis, descriptive statistics on MS Excel were used.

4.4 Research setting

A wide range of both small scale and city-wide-impact projects have become a common feature in major cities aiming to maintain and enhance their global competitiveness while simultaneously facilitating socio-economic progress. Affectionately known as the 'Corridors of Freedom', the City of Johannesburg is embracing these transit oriented developments as the main premise for addressing and redressing the spatial legacy of apartheid. As indicated earlier, these corridors are envisaged to substantially transform the spatial landscape of Johannesburg and in the process promote sustainable development through mixed land use (of high density) complemented by high quality public transit. A number of these corridors have since been identified for both the medium and long term, respectively.

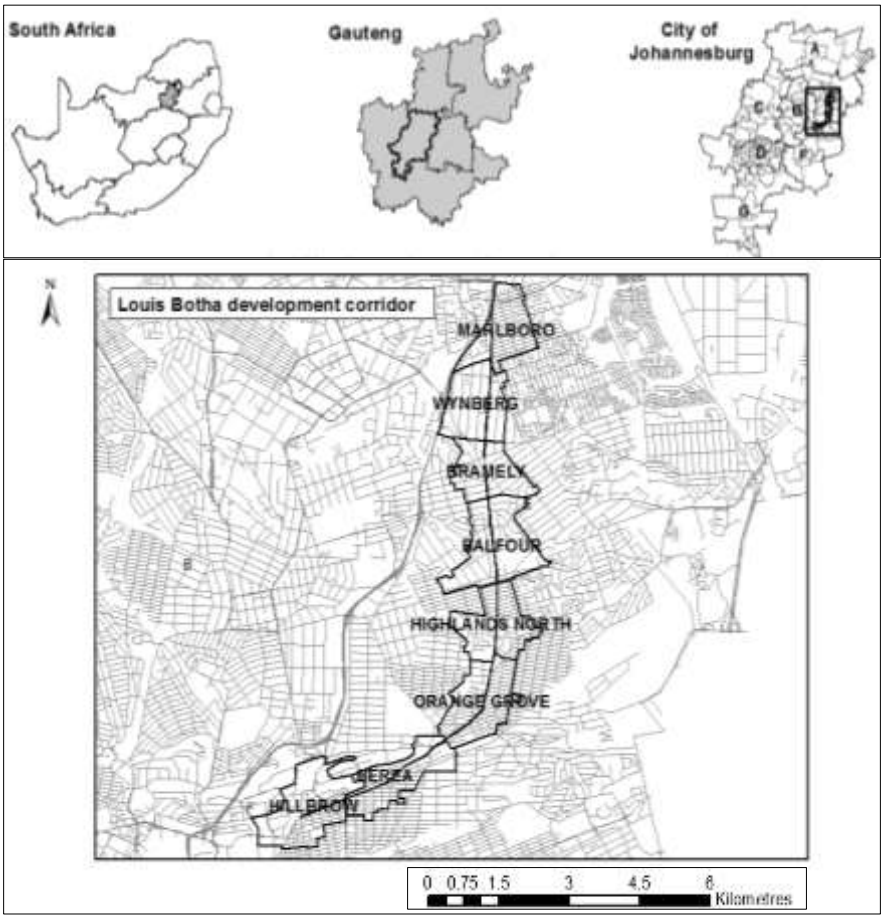
Table 1 – Identified 'Corridors of Freedom'

In the medium term - 2016	In the long term – 2040
Soweto to CBD along Perth Empire	Sandton/Randburg to Diepsloot
CBD to Alex	Alex to Ivory Park
Alex to Sandton	
Turfontein node	
Mining Belt	

Source: City of Johannesburg, 2013:6

In the 2013/14 financial year – the Soweto to CBD corridor along Perth Empire, CBD to Alex corridor along Louis Botha, and Turfontein corridor were respectively identified as priority corridors. Construction works along the Perth Empire corridor have been completed and the Bus Rapid Transit (BRT) service is in full swing. The Louis Botha development corridor has been taken as the second phase of the project, with construction works therein currently underway. Since the main objective of this study is to ascertain TOD perceptions in terms of planning and implementation, the Louis Botha development corridor was selected as the unit of analysis since it is currently undergoing a TOD initiative. Studying the entire stretch of the corridor was however not possible. As such, we had to identify three specific nodes located along the corridor to conduct this study (see section 4.5 below). The location of the corridor within the context of the City of Johannesburg is illustrated in Figure 1 below.

Figure 1 – Locality of the Louis development corridor



4.5 Study areas

Selecting the three nodes for this study was achieved through GIS data analysis. The data used was specific to the primary objectives of the 'Corridors of Freedom' along Louis Botha. In this regard, the first step was to analyse the proposed footprints of 'mixed land use' and 'densification' focus along the whole stretch of the corridor (see Figure 2 below). An analysis of existing economic nodes along the corridor was also carried out. Following this, an indicative set of three indicators was formulated and subsequently used to identify those nodes that satisfied all the conditions of this set as explained below.

Firstly, the node would have to be identified as a potential area for future densification. GIS data was used to ascertain this requirement for each node. Secondly, the node would similarly need to be identified as a potential focal area for future mixed land use. The last condition required that the node be classified as a non-economic node. This analysis culminated in the selection of Orange Grove, Balfour, and Bramley as shown below.

Figure 2 – Selected case study nodes

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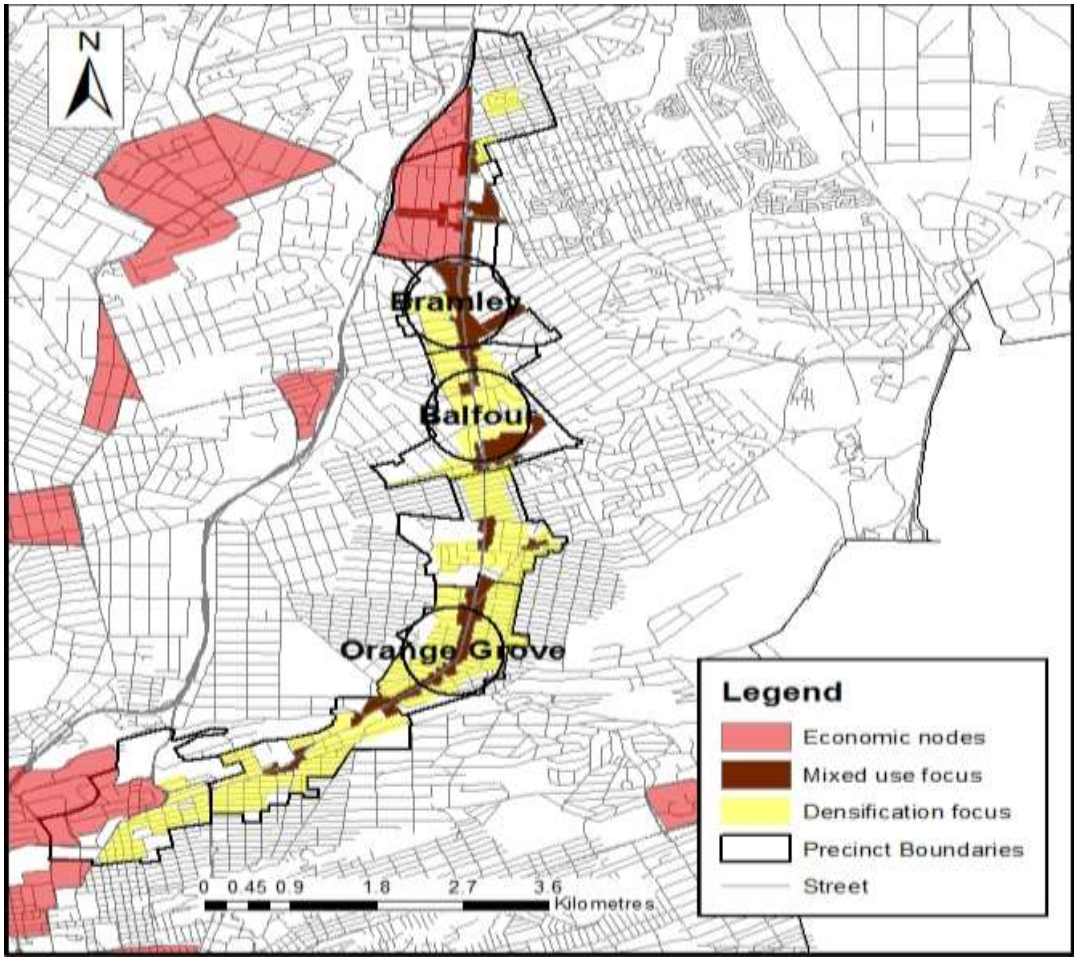

The 2010 Regional Spatial Development Framework (RSDF) for Region E states that Louis Botha is a mobility spine "…characterised by offices, retail, small-scale enterprises and nightclubs. Constraints include a lack of parking, burgeoning nightclubs and illegal activities. The street requires constant law enforcement and intervention with regard to building control, the management of illegal activities on the street and infrastructure" (COJ, 2010). The issues identified above were found to be of varying degree across the three selected nodes.

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The Orange Grove node is predominantly residential. However, there is a high concentration of small scale ground floor businesses situated immediate to Louis Botha (Figure 3). Characterised by depilating building structures, the node is showing visible signs of infrastructural ageing and deterioration. In addition to illegal uses as asserted in the RSDF for Region E, parking is also a major challenge in this node. Current measures through curb side parking are not adequate given the business significance of the node.

Figure 3: Orange Grove node

Figure 4: Bramley node

Bramley is also characterised by a footprint of residential dwellings. Unlike the Orange Grove node however, this residential component is of a small scale. The node is complemented by a variety of different uses such as shops, small retail centres etc. Located adjacent to the industrial node of Wynberg, it does not come as a surprise that this particular node has seen a gradual spillage of some industrial activity directly from Wynberg.

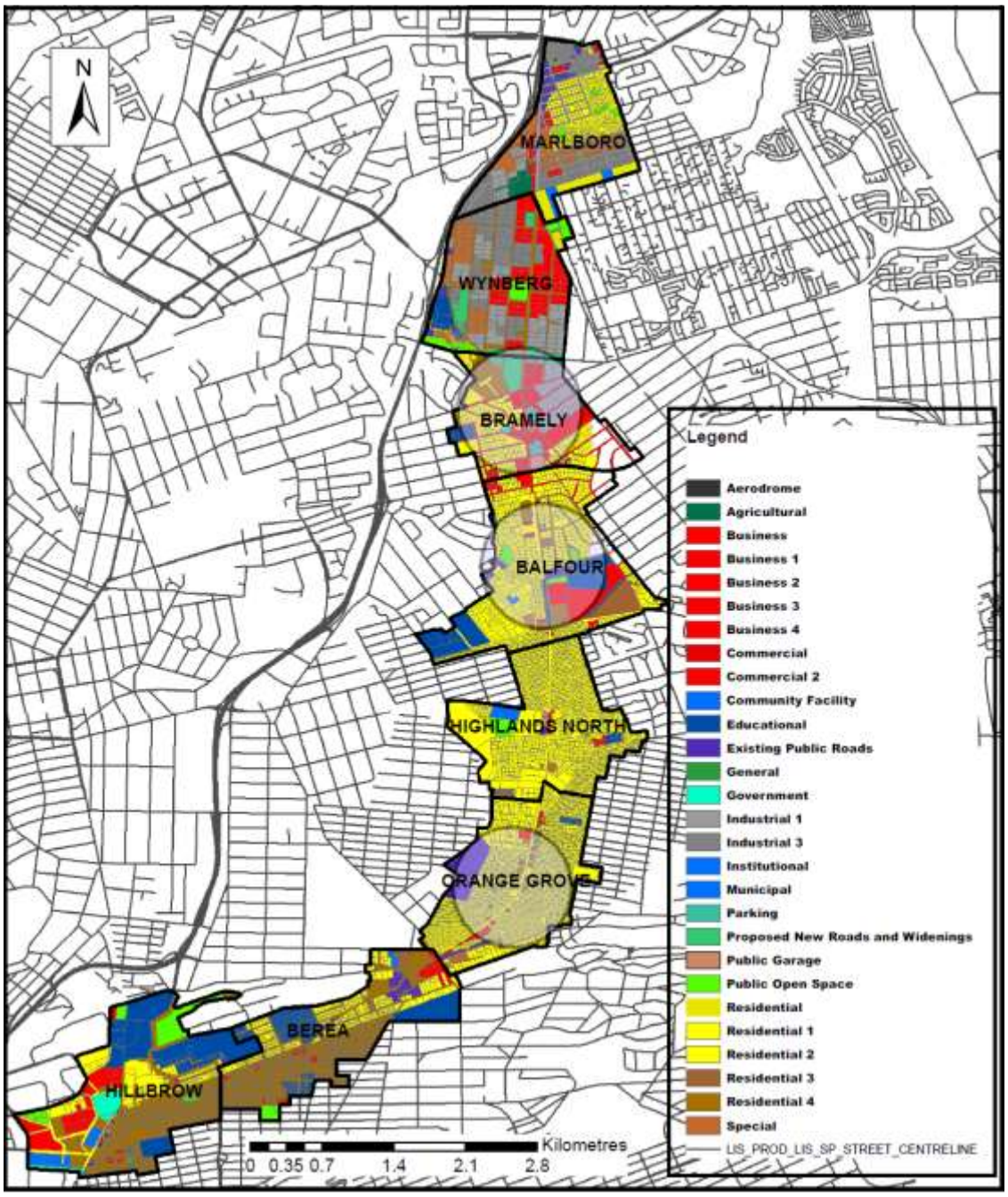
Similar to other nodes located along the corridor, redevelopment of certain segments of the Bramley node is essential.

Figure 5: Balfour node

Balfour is located just in between Orange Grove and Bramley. It is classified as a district node according to the 2010 RSDF and has been identified as a future intensification area for non-residential development. Construction works for the proposed Bus Rapid Transit (BRT) service are clearly visible in the image

The diagram below illustrates the current zoning of properties along the entire stretch of the Louis development corridor.

Figure 6 – Zoning along Louis Botha



Orange Grove and Balfour are predominantly residential in character, though prevalent with bits and pieces of small scale business enterprises in specific locations. The Bramley node exhibits high levels of business activity alongside a small footprint of residential uses.

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5. RESEARCH ANALYSIS & FINDINGS / RESULTS

5.1 Demographic details

The table below summarises the demographic distribution of respondents who participated in the survey.

Gender	**Male**	**Female**			
	13	11			
Age	<18	19-36	36-55	>55	
	0	17	7	0	
Nationality	South African	Non-South African			
	20	4			
Race	Black African	Coloured	Indian/Asian	White	
	19	1	4	0	
Marital status	Single	Married	Divorced	Widowed	Separated
	15	7	1	1	0
Residential status	Local Resident	Visiting	Different locality		
	14	8	2		
Education	No schooling	Primary school	Secondary school	Grade 12/Std 10	Higher (Graduation)
	0	0	9	10	5
Employment	Yes	No			
	15	9			
Monthly Income	<3000	3000<5000	5000<7000	7000<10000	>10000
	7	6	1	1	2
Physical disability	Yes	No			
	0	24			

5.2 Corridor determinants

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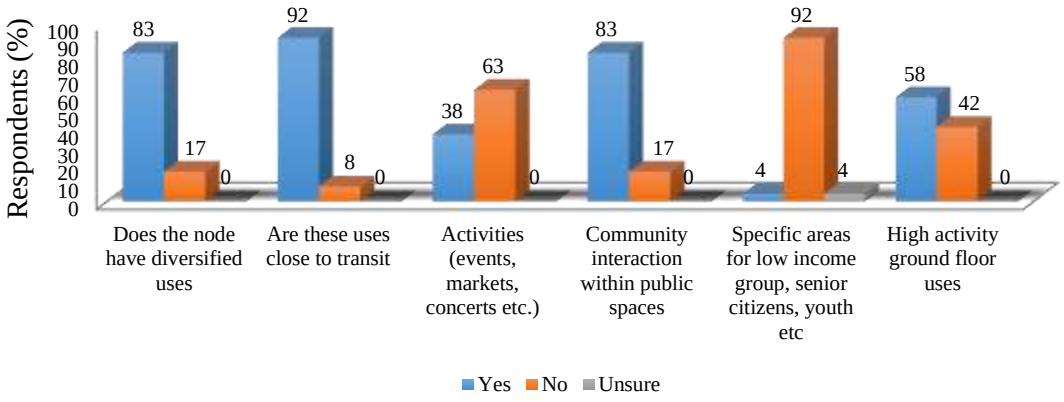
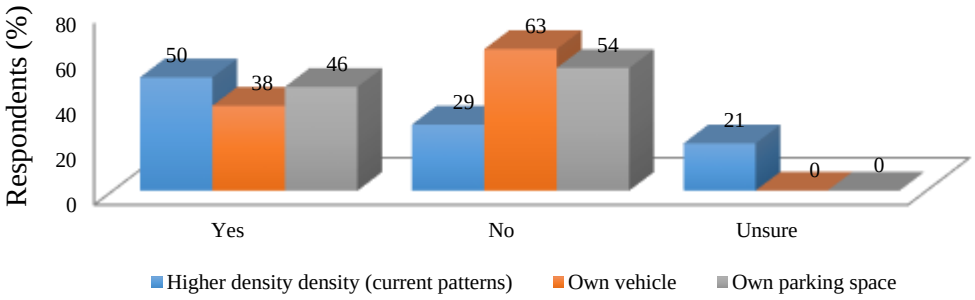
This section was intended to ascertain the perceptions of residents through a status quo analysis type of questions which were based on the 6Ds of TOD. The survey results have thus been arranged categorically in terms of Diversity, Density, Distance, Design, Destination, Demand management and are analysed in succession.

Diversity



Diversity is a critical aspect in TOD. Essentially, it captures the vitality and land use assortment of a node. 83% of the responses indicated that the land uses within the respective nodes are diversified. On the other hand, there was less satisfication with the vitality of these nodes in terms of activities such as concerts, events, markets; that is to say, entertainment. There is also an apparent lack of areas that cater to specific social groups such as the youth, senior citizens, etc. These kind of social encounters add a special touch to TOD within nodes. High activity ground floor uses equally form a fundamental aspect to TOD. Within the study nodes, 58% of the respondents agreed that there are high activity ground floor uses thereof. The researcher also used personal observation to ascertain this aspect by taking photographs It was observed that the level of ground floor uses varies from one node to the other. The Orange Grove node has the most intensity of ground floor uses compared to the other two nodes.

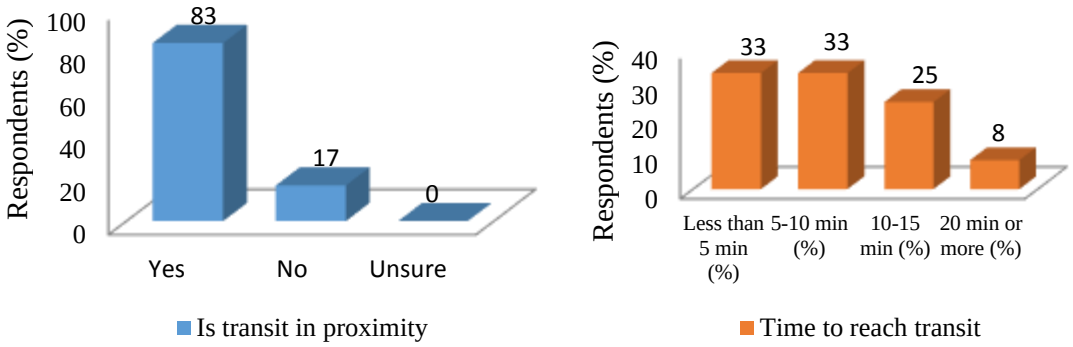
Density



Density provides an indication of how well land uses are located in relation to public transit. In this section, the intention was to establish whether patterns of development in the nodes are in cognisance of the current global awareness for higher density development. Half of the respondents indicated that development within the nodes indeed follows a high density pattern while 29% disagreed. The remaining 21% of respondents were unsure. This aspect of TOD also has implications on automobile ownership and usage. Higher densities may discourage the use of private vehicles (not necessarily ownership) since it substantially reduces the distance to facilities and services. 38% of respondents own

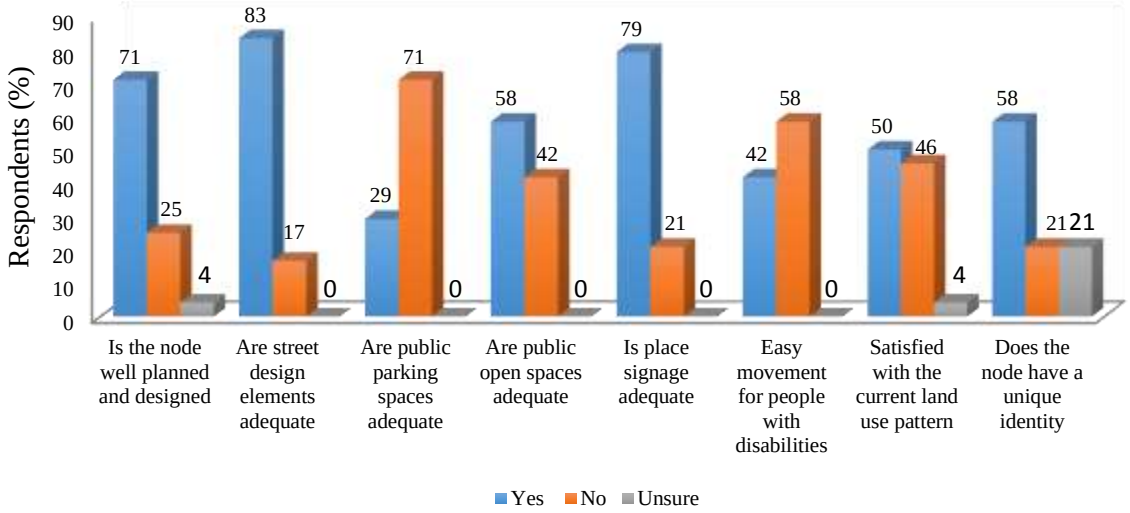
a car and indicated that it is their main mode of transport used for making different trips. Although some respondents indicated that they do not really own a car, they however did indicate that they do own a parking space.

Distance



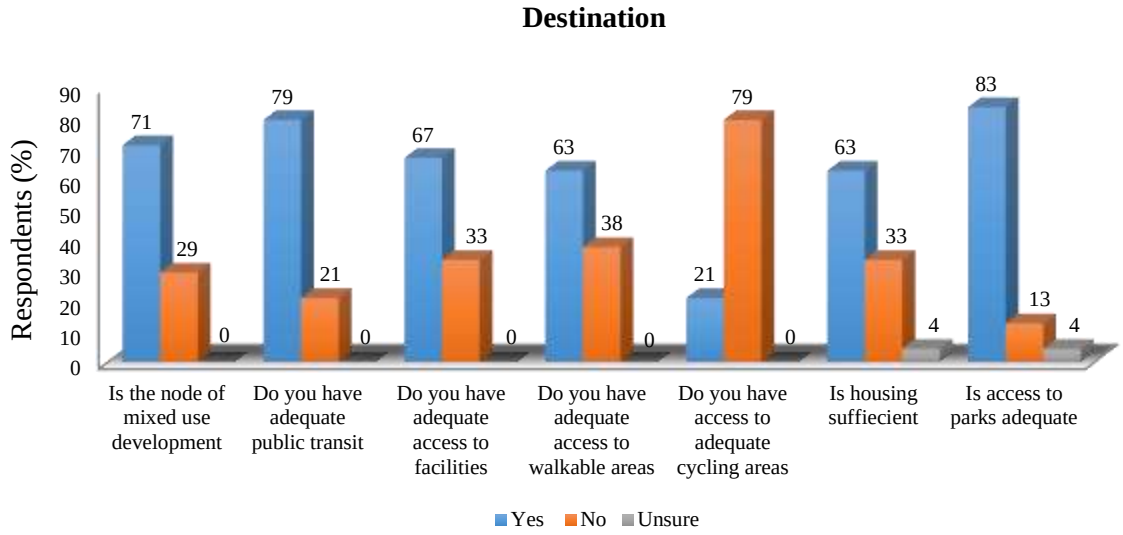
In terms of transit proximity, the bar graph indicates a rather high percentage of respondents who feel satisfied thereof (83%). The second graph translates this satisfaction in terms of time taken to reach a transit service. 92% fall within the range of less than 5 minutes to 15 minutes of walking time to transit, indicating a high level of existing public transport services. Although this was not provisioned in the questionnaire, it was noted that the idea of a new public tranport service like the BRT did not resonate well with many respondents. The high number of satisfaction with existing transit could perhaps be the explanation for this positionality.

Design

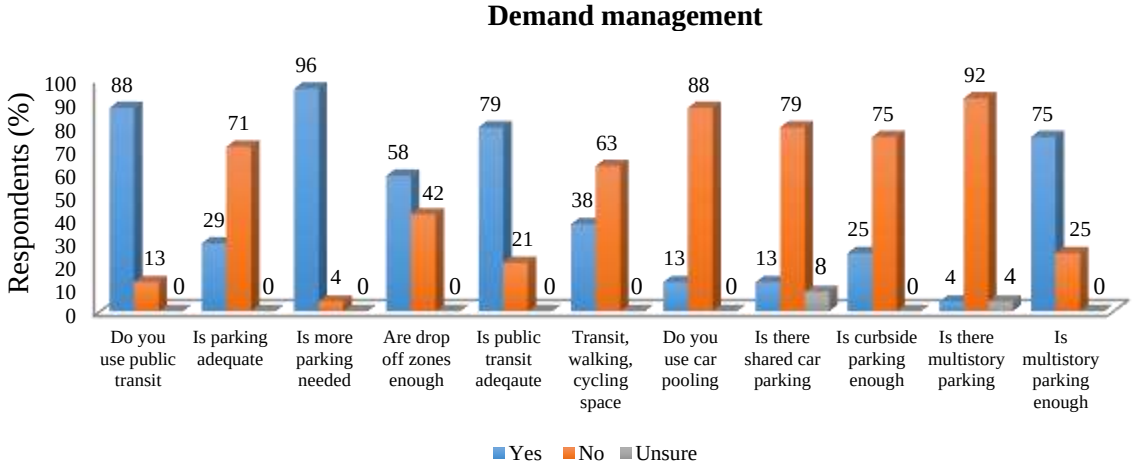


In addition to facilitating access to different services and amenities, TOD is also about designing high quality and attractive environments. This section of the questionnaire sought to determine the perceptions of respondents with regard to the overall design character of the nodes. An average of 71% responded that the nodes are well planned and designed in contrast to 50% responses that indicated a

dissatisfaction with the current land use pattern. This comparison is premised on the argument that land use patterns play a major role on the overall quality of the nodes in terms of design. Parking is also one critical aspect that is a major challenge in the nodes. As shown in the graph, 71% of the respondents indicated that there is not enough public parking in these nodes. Another important dimension of 'design' is that it must also facilitate easy manouvering for people with disabilities. In this study, 58% of the respondents pointed out that the current design of the environment does not facilitate for this manouvering.



An ideal TOD node is characterised by a variety of mixed use developments that are easily accessible. From the bar graph above, 71% of the respondents expressed satisfication with the current mixture of uses along the three nodes, indicating a good potential for TOD within these nodes. With regrad to public transit, 79% of the respondents are of the opinion that there is adequate public transit in the respective nodes. An analysis of the type of main modes of transport used revealed that the minibus taxi is used more often than other modes (Metrobus and PUTCO). There can be various reasons thereof. In line with theory and practive nevertheless, the importance of a high quality public transit service cannot be emphasized enough in encouraging a modal shift. Walkability and cycling are also crucial elements in TOD. As noticeable from the graph, a lack of cycling areas is a major challenge within the subject nodes. Although walkability is well above the average (67%) in terms of satisfication, there is still a scope to improve on this aspect.



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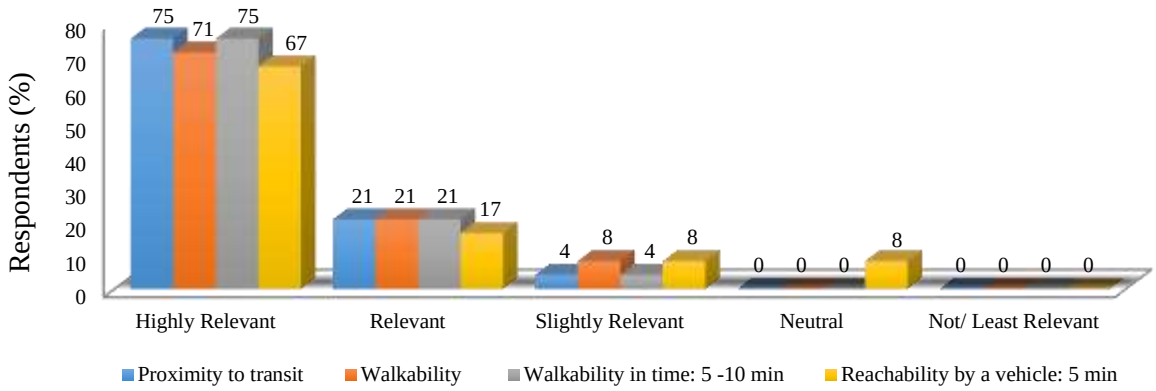
As reflected in the graph above, an overwhelming percentage of respondents (88%) make use of public transport. As also indicated earlier, minibus taxis are the main mode of transport used. However, 68% of the respondents are not content with the space that is allocated for transport, walking, and cycling. This is broken down as follows. In terms of transport, it has been indicated above that it is adequate within the relevant nodes. Notwithstanding this, the main concern is the little space that has been allocated for it. A well-documented problem of poor capacity roads is traffic congestion, which at times contributes to road fatalities. With that said, an environment that offers a high quality walking and cycling scape is also a key objective of demand management. The responses of participates surely indicate that there is not adequate space allocated for these important aspects. The problem of inadequate parking has already been well articulated above. 75% of respondents indicated that multi storied parking could be a solution to the problem. There is great potential for the promotion of carpooling facilities which can also go a long way in reducing parking pressures.

To this end, the analysis above indicates that the Louis Botha development corridor exhibits a high level of transit service. However, in as much as high levels of transit do not necessarily equate to efficiency, the undertaking of TOD extends far beyond issues of only transit functionality. For instance, although good design principles might not necessarily have a direct effect on transit riding, they nevertheless have a profound effect on the quality and attractiveness of a transit area. Eventually, transit ridership levels are most likely to increase as people will naturally be drawn to these high quality and attractive areas.

5.3 Perceptions and scoring

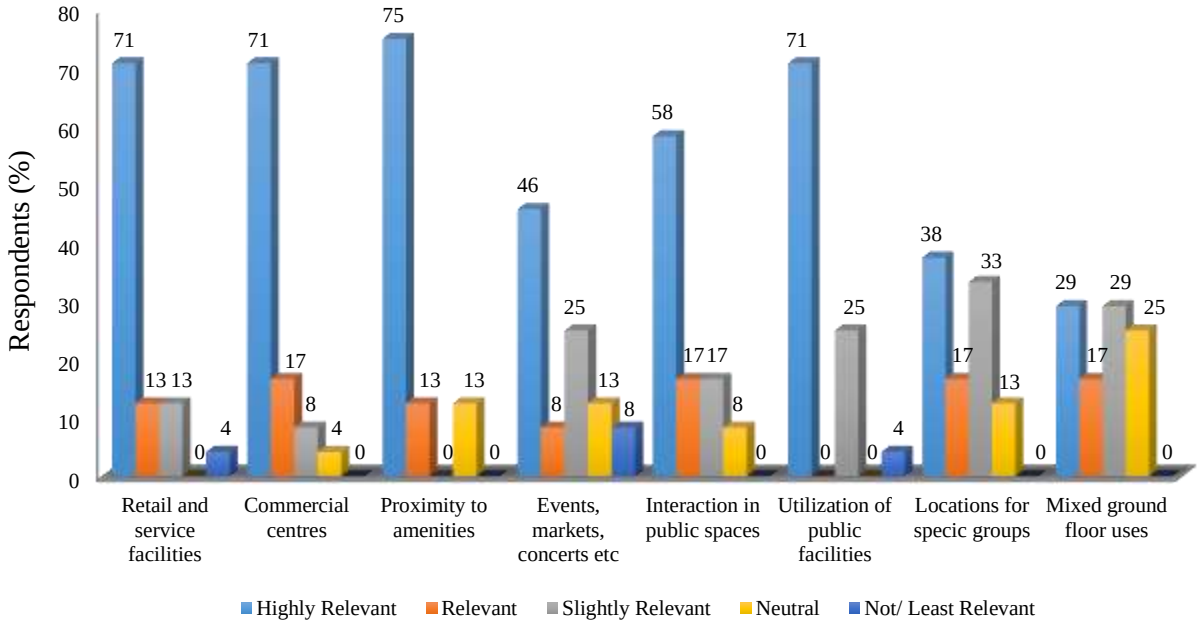
In section four of the questionnaire, respondents were afforded the opportunity to indicate the importance of several themes for each respective "D" variable of the 6Ds. As such, respondents were asked to score the relevance of these particular themes in TOD based on a predetermined scale. The graphs below summarise the results attained thereof for all the six "Ds".

Distance



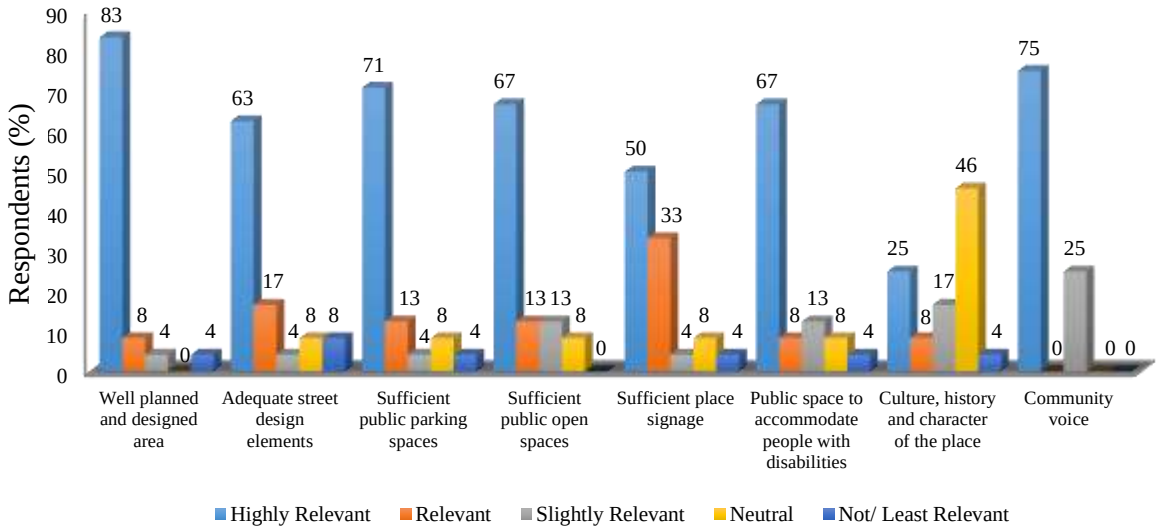
From the graph above, the importance of transit proximity, walkable environment, and less walking time is well emphasized by virtue of the high scores recorded for these categories. None of the respondents considered these as least relevant. Drawing conclusions from this trend, distance to transit (5-10 min) in terms of walking time resonated well with the respondents.

Diversity



One of the key objectives of TOD is the attainment of a compact urban form with a variety of mixed land uses. Arguably, high activity ground floor uses also play a fundamental role in accomplishing this goal. However, only 29% of respondents rated such uses as highly relevant while 29% scored them as 'slightly relevant'. This is to be expected since one only finds a significant number of ground floor uses in the Orange Grove node while the other two nodes have smaller footprints in this regard. One would thus conclude that there is lack of a general understanding of the importance of these uses.

Design



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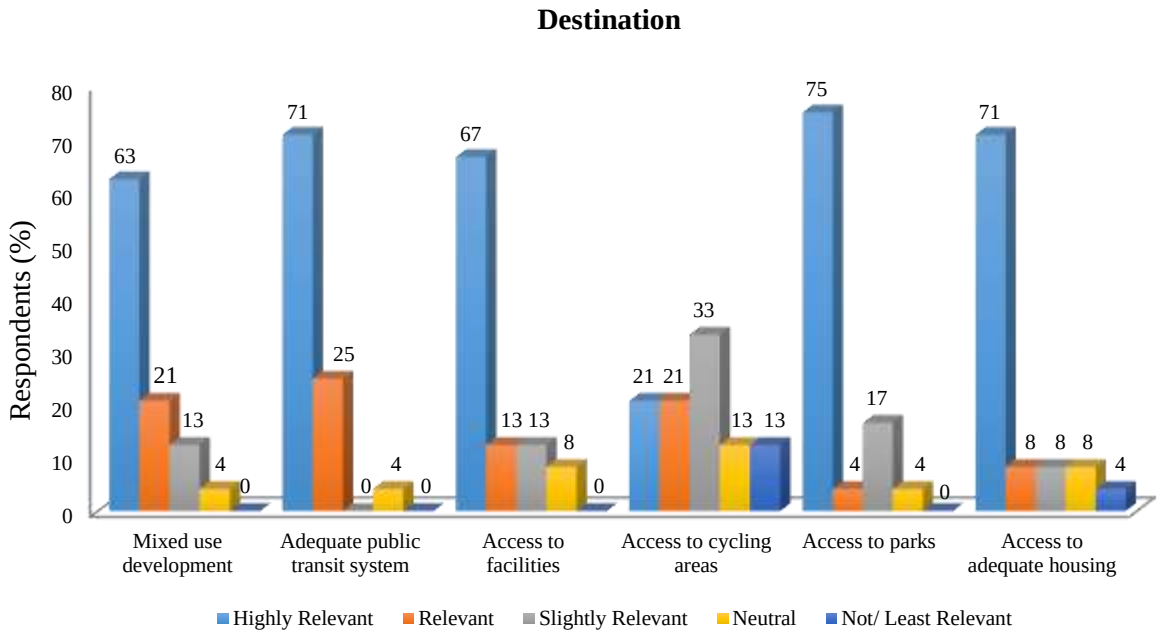
A general inference from the graph above is that design is very critical in TOD. 83% of participants agree that a well-planned and designed area is highly relevant when undertaking TOD. This includes, inter alia, adequate street design elements such as sidewalks, transit stops, comfortable waiting areas, adequate place signage that is conspicuously placed, a cityscape that is well suited to people using wheelchairs and other human assistive devices for the disabled. The mobilisation of communities in planning matters and decisions that affect them (community voice) was similarly scored as highly important.



A blend of adequate public transport and a compact urban form with a variety of land uses is an important indication of the destination accessibility of a corridor. A mixture of different land uses brings many services and facilities in close proximity, consequently facilitating easy access by transit, better yet by walking and cycling. In the graph above, the categories of 'mixed used development', adequate public transit', 'access to parks', and 'access to adequate housing' have been scored as 'highly relevant' by respondents. This is a good indication of the importance for land use and transport integration in corridor planning. Taking cognisance of this imperative offers benefits associated with not only an improvement in the overall quality of the environment, but that of life as well.

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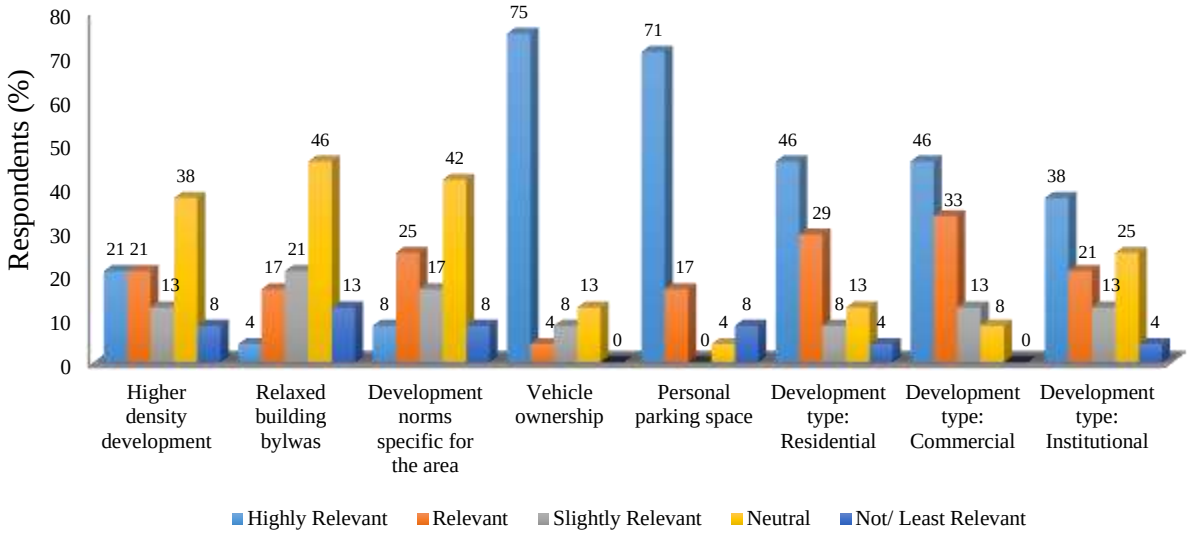
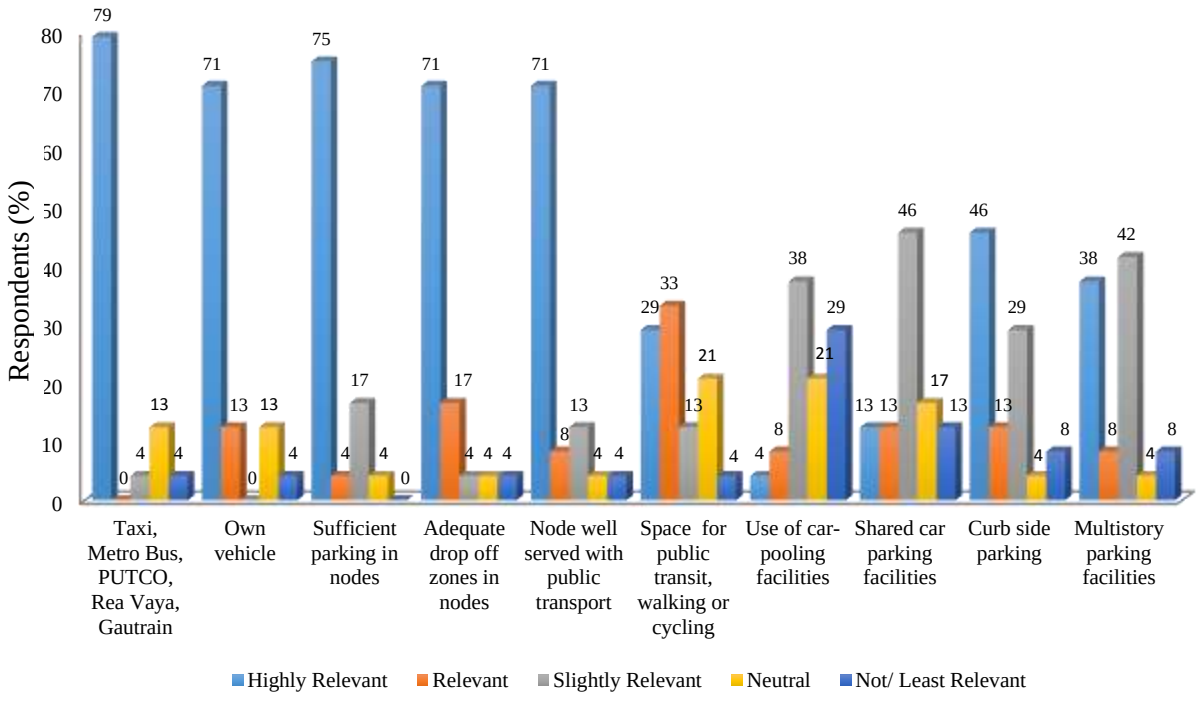
Density



In terms of density, the results reveal some stark realities. A mere 21% of respondents consider high density development as highly relevant in the nodes. A slightly bigger proportion of 38% feel neutral while 8% see high density development as least relevant. Vehicle ownership and a personal parking space were scored as highly relevant. This trend needs to be seen as a potential threat toward achieving a modal shift to public transit. A low score was also recorded for residential, commercial, and institutional developments. The three categories all score a little under the average in terms of their relevance (46%, 46%, and 38%, respectively). This might suggest that there is already a reasonable supply of these development types within the nodes.

Demand management



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Public transit is very crucial in corridor development. 79% of participants scored the different modes of public transit as highly relevant in the nodes. Adequate parking was also scored highly (75%) in terms of relevance. In light of current challenges related to parking as alluded to earlier, the importance of parking planning and management cannot be emphasised enough. A high percentage (46) of respondents consider curb side parking as the best alternative to other parking management methods such as shared car parking and multi-story building parking facilities, respectively. The central theme of demand management nevertheless is to reduce vehicle trips. Increasing the share of public transit is thus of paramount importance.

While the City of Johannesburg has embarked on its 'Corridors of Freedom' (synonymous with Transit Oriented Development) vision, an analysis of perceptions regarding TOD reveals a rather poor awareness of the broader picture among the public. Although the importance of a well-planned and designed area was well emphasized by most respondents, other critical TOD elements such as shared parking facilities, carpooling, and multi-story parking were not so favoured.

6. RESEARCH CONTRIBUTION

The contribution of this study is twofold. Firstly, it provides empirical findings of the perceptions of residents regarding TOD in the case study nodes. In the prologue of the objectives of this study, it was mentioned that undertaking TOD in built up areas is a complex enterprise. The study has been able to establish how residents understand TOD and what they consider crucial in the development of their neighbourhoods. Secondly, the study provides a set of useful determinants that can be used to prioritise the deliverables of TOD initiatives. Although not intended to be a standard reference point, this set reflects a widely recognised importance of specific determinants in TOD and place making.

7. CONCLUDING REMARKS

Questionnaire surveys were conducted in three nodes located along the Louis Botha Development corridor to discover the perceptions of residents regarding TOD planning and implementation. Analysing the collected data provided some useful insights in this regard and made possible the identification of several common points. In view, while increasing public transit ridership is a critical aspect of TOD, it should not however be considered as an end in itself. Embarking on TOD projects equally requires a critical reflection on various other implications associated with such development around the transit areas, e.g. facilitating an affordable housing stock, improving the attractiveness of the area and so forth. In order for the City to gain support and community ownership of envisaged TOD initiatives, the critical importance of strengthening community participation cannot be emphasised enough. In sum, the research study provided a detailed insight on the key determinants that were identified most critical in TOD and place making within the nodes. The selection was informed by the high scores recorded for these determinants in terms of their high relevance to TOD:

Sr. No.	6Ds	TOD - Place Making Determinants	Respondents Score: Highly Relevant (%)
1	Destination	Access to parks	75%
		Adequate public transit system; and access to adequate housing	71%
2	Design	Well planned and designed areas	83%
		Community voice and involvement	75%
3	Density	Vehicle ownership	75%
		Personal parking space	71%
4	Distance	Proximity to transit area; and walkability time (5-10 min)	75%
5	Diversity	Proximity to amenities	75%

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		Retail and service facilities; Commercial centres; and utilization of public facilities	71%
6	Demand Management	Public transport facilities (Taxi, Metro Bus, Rea Vaya, Gautrain)	79%
		Sufficient parking in nodes	75%

Although a huge proportion of respondents felt there is a need for more parking spaces around the nodes, they are however reluctant with the introduction of parking management strategies such as shared and multi-story building parking facilities, respectively. Other important aspects such as carpooling were considered least relevant.

8. RESEARCH LIMITATIONS

The research settings of the study were premised on specific population and sampling requirements. In other words, the replication of the same requirements in a different research setting may produce different results depending on the place specific land use and other determinants. As such, the extent to which the study findings can be generalised to other corridors necessitates further investigation. The sample size used in the study also covered a small proportion of the population in the selected case study nodes.

9. FURTHER RESEARCH

Although the study presents empirical findings of public perceptions toward TOD, further research is nevertheless required to verify whether the same findings can be generalised for other corridors as well. Larger samples will also be required in this regard. The present study gauged public perceptions in the context of nodes that are currently undergoing a TOD initiative. Further research thus needs to consider and evaluate the effectiveness of TOD in the subject nodes along the project corridors.

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11. REFERENCES

Bernick, M. & Cervero, R. 1996. *Transit Villages in the 21st Century*. University of California, Berkeley: McGraw Hill.

Bhishna, B., Khan, S. & Longland, M. 2005. Regulatory and incentive mechanisms to implement transit oriented development (TOD) in South East Queensland. *ERA-Humanities and Creative Arts*, 219.

Bird, D. K. 2009. The use of questionnaires for acquiring information on public perception of natural hazards and risk mitigation – a review of current knowledge and practice. *National Hazards Earth Syst. Sci.*, 9, 1307–1325.

Calthorpe, P. 1993. The Next American Metropolis; Ecology,Community, and the American Dream. Princeton Architectural Press, New York.

Carp, J. 2008. "Ground-Truthing" Representations of Social Space: Using Lefebvre's Conceptual Triad. *Journal of Planning Education and Research*, 28,129-142.

Cervero, R., & S. Seskin. 1995. "Transit and Urban Form." Report No. 6, National Academy of Science, Transportation Research Board, Washington, DC.

City of Johannesburg. 2013. *Corridors of Freedom: Re-stitching our City to create a new future* [Online]. Available: http://www.joburg.org.za/images/pdfs/corridors%20of%20freedom_s.pdf [Accessed 27 May 2014].

Christopher, A. J. 1992. Segregation Levels in South African Cities, 1911-1985. *The International Journal of African Historical Studies*, 25, 3, 561-582.

Curtis, C. 2012. Delivering the'D'in transit-oriented development: Examining the town planning challenge. *Journal of Transport and Land Use*, 5, 3, 83–99.

Dorsey, B. & Mulder, A. 2013. Planning, place-making and building consensus for transit-oriented development: Ogden, Utah case study. *Journal of Transport Geography*, 32, 65–76.

Kenworthy, J. R. & Laube, F. B. 1996. Automobile dependence in cities: an international comparison of urban transport and land use patterns with implications for sustainability. *Environ Impact Assess Rev*, 16, 279-308.

Krosnick, J. A. & Presser, S. 2010. Question and questionnaire design. *Handbook of survey research*, 2, 263-314.

Lefebvre, H. 1974/1991. *The production of Space.* Blackwell Publishing.

Lombard, M. 2014. Constructing ordinary places: Place-making in urban informal settlements in Mexico. ***Progress in Planning***, 94, 1-53

Merrifield, A. Place and Space: A Lefebvrian Reconciliation. *Transactions of the Institute of British Geographers*, New Series, 18, 4, 516-531.

Montgomery, J. 1998. Making a city: urbanity, vitality and urban design. *Journal of Urban Design*, 3,1, 93-116.

Pierce, J., Martin, D. G. & Murphy, J. T. 2011. "Relational place-making: the networked politics of place." *Transactions of the Institute of British Geographers*, 36, 1, 54-70.

Purcell, M. 2002. Excavating Lefebvre: The right to the city and its urban politics of the inhabitant. *GeoJournal*, 58, 99-108.

Rahman, S, M. & Al-Ahmad, H. M. 2010. Evaluation of Transportation Demand Management (TDM) Strategies and Its Prospect in Saudi Arabia. Jordan *Journal of Civil Engineering*, 4, 2.

Sale, J. E. M. et al. 2002. Revisiting the Quantitative-Qualitative Debate: Implications for Mixed-Methods Research. *Quality & Quantity*, 36, 43–53, 2002.

Santos, G., Behrendt, H. & Teytelboym, A. 2010. Part II: Policy instruments for sustainable road transport. *Research in Transportation Economics*, 28, 46-91.

Schensul, D. & Heller, P. 2010. Legacies, Change and Transformation in the Post-Apartheid City: Towards an Urban Sociological Cartography. *International Journal of Urban and Regional Research*, 35, 1, 78-109.

Simonsen, K. 2005. Bodies, Sensations, Space and Time: The Contribution from Henri Lefebvre. Geografiska Annaler. *Series B, Human Geography*, 87, 1, 1-14.

Suzuki, H., Cervero, R. & Luchi, K. 2013. Transforming Cities with Transit: Transit and Land-Use Integration for Sustainable Urban Development. The World Bank, Washington DC.

Talen, E. 2006. Design That Enables Diversity: The Complications of a Planning Ideal. *Journal of Planning Literature*, 20, 233-249.

Van Wee, B. 2002. Land use and transport: research and policy challenges. *Journal of Transport Geography*, 10, 259–271.

Williams, J. J. 2000. Urban transformation. *Cities*, 17, 3, 167-183.

Wirasinghe, S. C. et al. 2013. Bus rapid transit – a review. *International Journal of Urban Sciences*, 17, 1, 1-31.

Yang, Y. 2010. Sustainable urban transformation driving forces, indicators and processes. Theses, University Weimar.

Zhao, Y. et al. 2008. A travel demand management strategy: The downtown space reservation. European Journal of Operational Research, 205, 584-594.