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“Smart Cities in South Africa: A Case of ‘Misplaced Priorities’” or A Guide Towards Innovative Approaches to Socio-Economic Development?

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"SMART CITIES IN SOUTH AFRICA: A CASE OF 'MISPLACED PRIORITIES'" OR A GUIDE TOWARDS INNOVATIVE APPROACHES TO SOCIO-ECONOMIC DEVELOPMENT?

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, School of Architecture and Planning, in partial fulfilment/fulfilment of the requirements for the degree of **Masters in Development Planning.**

Degree: Master of Science in Development Planning (MScDP)

Declaration

I declare that this research report is my own. It is being submitted for the Bachelor of Science Degree of Master in Development Planning to the University of the Witwatersrand, Johannesburg. It has never been submitted before for any other degree or examination to any other university.

On: 24th day of October 2025.

Abstract

In developing countries, planning strategies and methods are influenced by 'western knowledge'. Planners in developing countries such as South Africa have had an increasing interest in helping their cities reach their full potential to achieve 'world-class' status (Dodero, 2010). In order to reduce systematic inefficiencies in the complex system of cities, city managers have turned towards the smart city concept as a new planning approach, to help promote integrated decision-making and collaboration within the various city departments (Westraadt and Calitz; 2018). This research evaluates South Africa's understanding of the ‘smart city concept’. This is done by evaluating the Greater Lanseria Masterplan, a masterplan currently proposing the construction of a ‘smart city’ in an area falling within three municipalities, the CoJMM, the CoTMM, as well as MCLM (GAPP *et.al*., 2020), thus assessing how the Lanseria Masterplan leverages ICT to create new governance or service-delivery models. This research aims to make use of participant observation to explore the ‘smart city concept’ and it’s interpretation in academia and in practice. This will be done through the attendance of bi-weekly project meetings by the GAPP team currently appointed by the Gauteng Growth and Development Agency, as well as through the attendance of smart city conferences and webinars. Follow-up interviews with Town Planners from the City of Johannesburg’s Development Planning department were conducted, following the initial findings from the conferences, bi-weekly meetings, and webinars. The GAPP Team was unavailable for interviews, however, were eager to allow the researcher into the bi-weekly progress meetings for their own assessment of the project. Additional attempts to contact community leaders and NGO’s operating in the Zandspruit community to establish contact were also unsuccessful, leading to the reliance on statistical data in establishing a socio-economic profile for the Zandspruit community. This research methodology was instrumental in developing a sense of their application in South Africa and allow for the evaluation of the masterplan. Constructing a ‘smart city’ in South Africa requires a great deal of investment from various stakeholders who may be motivated by their own interests (Allam and Newman, 2018). To cover infrastructure investment and development costs, joint planning initiatives with all parties are essential. Additionally, the ‘cultural and historical aspects, as well as the current metabolism’ of the Greater Lanseria area, need to be considered (Allam and Newman, 2018; 6). There is a clear determination to ensure that no one is left behind or negatively affected by the Lanseria mega project. So far, the project seems to be taking necessary steps to ensure that the project is well-integrated with neighbouring cities and developments.

Dedication

This research is dedicated to my father, Elvis Khoza, who passed on the 3rd of August 2021. May your soul rest in peace '*Hlase*'. I also dedicate this research to my mother, Nonceba Mbakaza-Khoza, my brothers Lindokuhle Ronald Khoza, Malibongwe Alex Khoza, My three sisters, Ntombovuyo Queen Khoza, Bulelwa Beauty Khoza and Fezeka Daphney Khoza, as well as my three nieces, Thembeka Kelly Khoza, Nonhlanhla Bella Khoza and Alunamida Khoza, and my nephew, Libongwe Khoza.

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List of Acronyms

AI	Artificial Intelligence
ANC	African National Congress
CICC	Centres of Communication and Control
CoTMM	City of Tshwane Metropolitan Municipality
CoJMM	City of Johannesburg Metropolitan Municipality
CoJ IDP	City of Johannesburg Integrated Development Plan
EE	Energy Efficiency
GCR	Gauteng City Region
GGDA	Gauteng Growth and Development Agency
GGT2030	Growing Gauteng Together 2030
GIFT-City	Gujarat International Finance Tech-City
GLMP	Greater Lanseria Master Plan
GSDF	Gauteng Spatial Development Framework
IUDF	Integrated Urban Development Framework
IDP	Integrated Development Plan/Planning
JDA	Johannesburg Development Agency
LED	Local Economic Development
MCLM	Mogale City Local Municipality
NDP	National Development Plan
NSDF	National Spatial Development Framework
PARI	Public Affairs Research Institute
RES	Renewable Energy Sources
SDGs	Sustainable Development Goals
SEZ	Special Economic Zone
SPLUMA	Spatial Planning and Land Use Management Act no 16 of 2013
TRAM	Transformation, Re-Industrialisation and Modernisation
ZUDF	Zandspruit Urban Development Framework

Chapter 1: Introduction and Background

1.1. Introduction

Planning techniques in many areas of the developing world have traditionally been based on top-down approaches, typically described as the *rational comprehensive* or *synoptic model* (Dodero, 2010). This influence of western knowledge was due to a growing interest by planners in developing countries to help cities reach their maximum potential and reach 'world-class' status (Dodero, 2010). Today, cities are increasingly embracing specialized technologies to address issues related to sustainable development, management of resources and balanced growth (Wataya and Shaw; 2019). The smart city concept encourages this prospect. This research aims to evaluate South Africa's understanding of the smart city concept. This will be done by evaluating the Greater Lanseria Masterplan, a framework currently proposing the development of a new smart city in an area falling within three municipalities, the *City of Johannesburg*, the *City of Tshwane*, as well as *Mogale City Local Municipality.*

1.2. Background

The Rational Comprehensive Model in urban planning refers to a decision-making approach that emphasizes a systematic, structured process for addressing urban issues (Hudson, *et.al*, 1979). It is based on the idea that planners should gather all relevant data, evaluate various alternatives, and choose the most optimal solution through a detailed, objective analysis (Hudson, *et.al*, 1979). The rational comprehensive approach is described as "the dominant tradition and the point of departure for most other planning approaches", (Hudson, Galloway, and Kaufman; 1979; 388). Acting to either modify its rationality or reactions from other approaches against it, this approach consists of four classical elements (Hudson, *et.al*, 1979). These elements are listed by Hudson *et.al.* (1979; 388) *as "(i) goal setting, (ii) identification of policy alternatives, (iii) evaluation of means against ends, and (iv) implementation of policy"*. In developing countries, planning strategies and methods for urban development have been based on this approach, such that, this planning approach underpins current planning policy in South African policy documents and development plans. These include the National Development Plan, as well as municipal Integrated Development Plans and Spatial Development Frameworks, for example. Under the influence of 'western knowledge', planners in developing countries have had an increasing interest in helping their cities reach their full potential to achieve 'world-class' status (Dodero, 2010).

In developing countries similar to South Africa, direct planning interventions included the adoption of planning legislation from the western world and the development of well-structured masterplans. The development planning approach for the Kingdom of Eswatini, for example, is guided by a National Development Plan 2023/24-2027/28, with it's vision focused on developing "a private sector-led, inclusive, and resilient economy" (Ministry of Economic Planning and Development, 2023;54). The Development Plan further develops goals and objectives, and provides a monitoring and evaluation framework, thus mirroring the classic elements of the rational comprehensive model. However, there have been numerous difficulties in promoting such developments in developing countries due to the complexity of the contexts in which these strategies are applied (Dodero, 2010). The rational comprehensive model believes "that society can respond and adapt to economic and planning mechanisms that have helped alleviate social, economic and urban concerns in the western world", (Dodero, 2010; 2). To guide urban development, government actions involve the reliance on the use of advanced techniques.

The beginning of the 21st century was marked by increased technological advancements. This shift was embraced by city planners and other professions in the built environment. City development has been increasingly concerned with sustainable development and balanced growth, with the intension to create socially inclusive and economically viable environments that stimulate sustainable development (Wataya and Shaw; 2019). Wataya and Shaw (2018) note that to achieve sustainable development that improves the socio-economic conditions in cities, there is a need to effectively manage city 'inputs'. These include effectively managing services, resources, and data to promote efficiency, reduce wasteful expenditure, and make use of resources in a smart way (Wataya and Shaw; 2019). Therefore, to reduce systematic inefficiencies in the complex system of cities, city managers have turned towards the smart city concept to help promote integrated decision-making and collaboration within the various city departments (Westraadt and Calitz; 2018).

South African President Cyril Ramaphosa's vision of a new smart city has led to the emergence of The Greater Lanseria Masterplan, an ambitious plan to build a new 'smart city'. The masterplan proposes a smart city around the Lanseria Airport, located towards the north of Randburg in the City of Johannesburg. The masterplan adopts an integrated approach to the development, with its vision being to develop "a truly post-apartheid city based on best practice in terms of urban sustainability and the principles underpinning the smart city", (GAPP Architects and Urban Designers, SMEC and PWC; 2020). The masterplan proposes

the development of a new city in a new geographical location, which aims to invest on both hard and soft infrastructure to develop a sustainable, socio-economic inclusive environment.

1.3. Problem statement and rationale

While the masterplan acknowledges the need to examine the cultural and socio-economic aspects of the area in which it is being applied, there is a considerable distance between its vision and the reality on the ground. The masterplan is a classic example of the rational comprehensive model built on the identification of urban challenges that can be solved by institutional 'rational' practices. There is a growing consensus that the poor socio-economic conditions in countries like South Africa have been the result of adopted planning techniques (Dodero, 2010). The implementation of the Greater Lanseria Masterplan, which was developed by highly qualified planners, could create a disparity between what people can afford and what planners aim to accomplish.

1.4. Aims and Objectives

While innovative developments are widely promoted as a policy objective in South African frameworks and masterplans, scholars note the challenges in the design and implementation of context-appropriate instruments and incentives (Peterson, 2019). As such, the research aims to evaluate the degree in which the ‘smart city approach’ to urban development in South Africa could impact the socio-economic fabric of the area in which they are applied. More particularly, this study intends to evaluate the influences it might have on residential areas falling within the proposed Greater Lanseria Masterplan border, more specifically in the Zandspruit Township. The main objectives are:

- To evaluate the affordability strategies outlined in the Greater Lanseria Master Plan for low-income and previously excluded groups, using policy analysis and stakeholder interviews to determine their feasibility and inclusivity.
- To assess the integration of traditional socio-cultural elements in the Greater Lanseria Master Plan, by analysing planning documents and conducting interviews with local community representatives.
- To critically evaluate the relevance of the Greater Lanseria Master Plan in addressing socio-economic challenges in South African municipalities, focusing on its alignment with local needs and national developmentpriorities, through comparative analysis and expert consultations.

1.5. Research Question and Sub-questions

To what extent would the development of Lanseria Smart City help address the socio-economic challenges faced by residents in Zandspruit – a previously excluded community that falls within the proposed smart city footprint – as measured through indicators of income, employment, service access, and digital inclusion?

- What are the main socio-economic challenges faced by Zandspruit residents?
- How would the principle of concentration, underpinning the compact city approach used as a strategy for socio-economic development in the GLMP, relevantly address these socio-economic challenges?
- Which implementation structures/strategies/approaches – governance, coordination, finance, and digital-service delivery – will best translate the masterplan's objectives into tangible outcomes for Lanseria Smart City?

1.6. Initial Literature Review

The incorporation of western knowledge and planning practices can be traced back to the end of World War II (Dodero, 2010). The intention was to 'modernize' and improve urban conditions. For South Africa, this meant the concept of segregated development of black South Africans outside of areas reserved for white South Africans. This was based out of an apartheid ideology based on the "myth of early white settlers encountering an empty land and their fear of Black domination" (Haaroff, 2011; 185). To meet labour demand in urban areas, low-cost housing programmes were built on the urban peripheries in designated zones which were organized according to racial classifications. The outcome of this was the establishment of the apartheid city characterized by a distinct spatial structure and inbuilt inequalities (Haaroff, 2011).

South African municipalities are expected to experience rapid urbanization, caused by increased population growth. As urban municipalities grow, they face greater demands for service delivery (Ncamphalala Vyas-Doorgapersad, 2019). This increases the demand for urban renewal strategies, increasing the need to develop smart solutions to provide 'seamless services' to communities (Ncamphalala Vyas-Doorgapersad, 2019). Because of this, city planners and urban practitioners are making use of technology to resolve 'logistical problems' and improve liveability through tools such as “Information and Communication Technology

(ICT), the Internet of Things (IoT), and more recently, Artificial Intelligence" (AI) (Allam and Dhunny,2019; 80).

South Africa has embraced the e-services delivery model, a shift towards new public management and service delivery model which is linked to ICT (Pieterse, 2019). This evolved from the concept of e-Governance, which is used by urban managers as a public management tool to help improve the efficiency and/or delivery of services (Ncamphalala and Vyas-Doorgapersad, 2019). Poor service delivery and increased urbanisation has put more strain in the daily functioning of municipalities. In response to this, local municipalities have introduced NPM inspired initiatives for public management. These include private-public partnerships, decentralisation, and alternative mechanisms such as ICT, with the vision to transform cities into smart ones. So far, this entails an increased focus on digitisation, strengthening social networks and increasing access to internet connectivity to increase social-media engagement and to increase public awareness and participation. The main goal, however, is to transform cities into smart cities through smart mobility, smart energy, smart water, and smart transport, amongst a few (Pieterse, 2019).

There is a large spectrum of smart city approaches. On the one hand, there is private company's technological and technocratic approach and the central positioning (Desdemoustier et al; 2018). On the other hand, there exists a non-technological dimension that focuses on soft infrastructure investment and considers the culture and historic urban fabric (Allam and Newman, 2018). In between these approaches, there is a human and creative approach and the sustainable approaches. The human and creative approach is centred on "human capital and knowledge creation, utilizing creativity, human knowledge, and cooperation to respond to social challenges" (Desdemoustier *et al*, 2018; 131).

The sustainable approach focuses on promoting the development of a 'green economy' with 'high social awareness' and improving the 'quality of life' for current generations "*without compromising the ability of future generations to meet their needs*" (Desdemoustier *et al*, 2018; 131). Westraadt and Calitz (2018; 5) notes SALGAs' definition of a smart city which recognizes how, "different industries approach the subject from their comfort zones. IT companies define a smart city through a technical lens, developers focus on physical infrastructure, utilities insist it is about sustainable energy, and the green lobby champions the environment" (Westraadt and Calitz, 2018; 5). In South Africa, a smart city is understood as one that encompasses all these approaches.

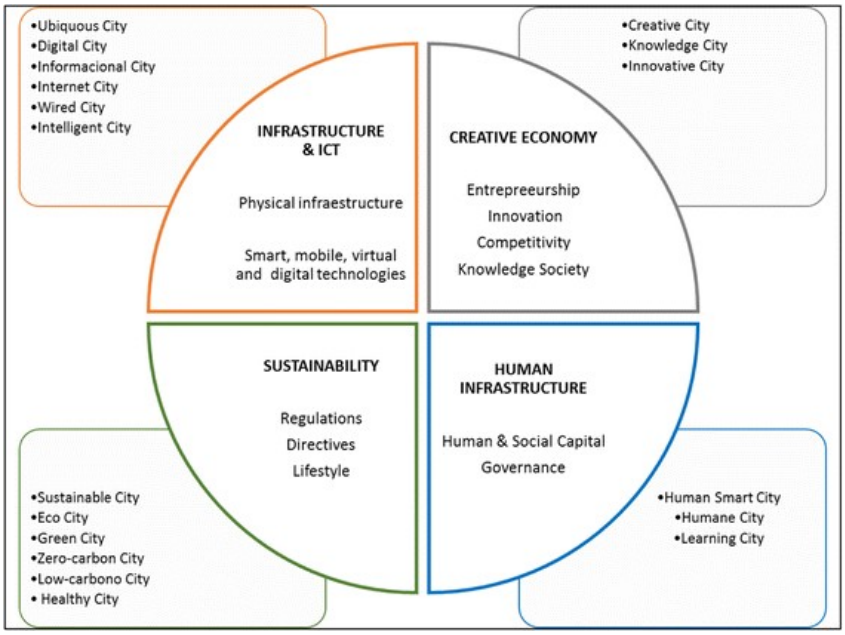


Figure 1: Characterisation of Smart Cities. (from Nam and Pardo 2011)

Smart cities provide people and the environment with high-tech infrastructure that utilizes data and technology to provide service delivery and quality of life enhancements for residents (Westraadt and Calitz, 2018). However, "to support these efficiencies, flagship smart cities often put the technology at the centre and want to implement all innovations at once. This often occurs at high upfront capital investments, which are mostly recovered through higher property values and rental properties. This immediately excludes the majority of the population from being able to afford to live in a smart city", as argued by Tijs van den Brink in an interview with a reporter from IOT (2021).

1.7. Research Method Paradigm

This research will make use of a mixed methods research approach, through a combination of ethnographic research to help provide an in-depth description of the planning and development of the Lanseria Smart City, and quantitative research through making use of secondary statistical data. The statistical data will be applied in order to develop a socio-economic profile of Zandspruit Township, to better understand the development interventions required to address the socio-economic challenges. The ethnographic research approach will be applied through making use of participant observation studies. Participant observation is a qualitative and interactive research methodology that is relatively unstructured. It is associated with explanatory or exploratory research objectives that investigate either why a phenomenon has taken place, to uncover cognitive elements, rules and norms underlying observable behaviours or casual explanations. Data generation in participant observation is

often interpretive, an aspect that is considered this research method's greatest strength and its source of criticism. This is because the data gathered is, in some respects, unique to the researcher. Participant observation research allows for the development of a connection to basic human experiences which are discovered by "immersion and participation" within a specific context. The challenge, however, is systematizing and organizing inherently fluid human processes. This requires note taking, audio recording and taking site images, as well as asking questions to help uncover the meaning behind the participant's behaviour.

1.7.1. Research Design

The research is a qualitative study which will be conducted through attending bi-weekly meetings by representatives and developers of the Lanseria Smart City. Data will also be collected through attending smart city webinars and conferences, to comprehend the manner in which the smart city concept is defined, understood or interpreted in South Africa's smart city ecosystem. The researcher will be participating as a guest, visitor or audience member, to observe how other research scholars, representatives of the smart city initiative and municipal authorities engage and discuss the proposal of a new smart city. This means that the research will be highly observational as the researcher's role within the study will be less visible. Data will be gathered through note taking, audio recording and short structured and semi-structured interviews with one or two conference or webinar attendee. Casual conversations regarding the smart city concepts from community groups through social media such as WhatsApp will also be used to develop a general understanding of the view on the Greater Lanseria Masterplan within the planning field.

Field studies will also include the use of census and statistical data to develop a socio-economic profile of the community of Zandspruit. To understand the way the smart city concept is understood in South Africa, the research will examine and explore the Greater Lanseria Masterplan (GLMP), a masterplan that proposes the development of a smart city in the Lanseria Regional Spatial Development Policy

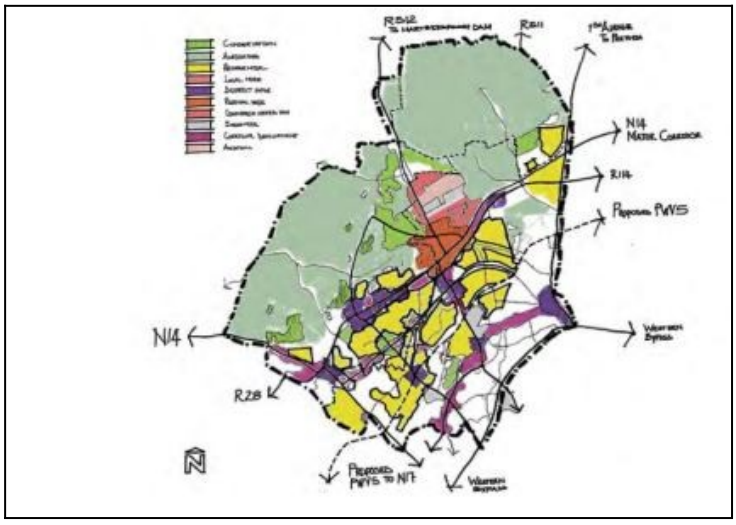


Figure : GLMP Development Concept - LRSDP, 2017, Fig 73.

(LRSDP) study area (GAPP *et.al.*, 2020). This will enable an in-depth analysis of how the Lanseria Smart City proposal, which adopts a largely technocratic, rational-comprehensive planning style, plays out in the South-African context.

The GLMP aims to align its vision with that of the Lanseria Regional Spatial Development Policy (LRSDF), a policy framework published in 2017. The GLMP is governed by the four overarching principles, along with eight associated objectives identified in the LRSDF. These principles include "(i) community, (ii) concentration, (iii) connection and (iv) conservation" (GAPP *et.al.*, 2020). The research aims to focus more specifically on how the masterplan addresses the principle of concentration, otherwise known or reffered to as the compact city development model. This principle involves constructing 'a well-defined spatial structure that connects people and places to enhance the region to facilitate economic growth and opportunities', GAPP et al. (2020). Accordingly, the analysis will assess whether the GLMP's concentration strategy can, in practice, reconnect Zandspruit residents to regional economic nodes.

Table 1: GLMP Development Principles

Principles	Goals	Description
1 Community: create strong cohesive communities for residents of the area to reach their full potential.	• Strong cohesive communities	Current housing patterns are fragmented and isolated from employment opportunities. Housing should be provided on land that is close to major centres with a focus on strong linkages to employment areas.
2 Concentration: Create a well-defined spatial structure that connects people and places and strengthens the region in order to facilitate economic growth and opportunities.	• Polycentric region linked to economic centres	Planning efforts that concentrate development and create a clear hierarchy will maximise planning efficiency, reduce sprawl and increase open space reserves.
	• Facilitate strategic economic development	Locations should be area specific and range from large scale developments to small rural service centres.
	• Sustainable rural development	Rural development and resource based industries should be encouraged.
3 Connection: strengthen connections to ensure integration into the larger Gauteng City Region and to ensure sustainable investment.	• Strengthen connections to larger GCR	Networks should support spatial development focus areas and encourage land use and transportation integration.
	• Investment that supports city growth	Strategic areas should be identified for development, using a phased approach, in order to focus capital investment in engineering services infrastructure.
4 Conservation: leverage the unique environmental and tourism assets of the region	• Preserve important natural assets	Allow for a continuous ecological and open space system.
	• Celebrate the region's uniqueness	Agricultural and tourism activities should be supported and enhanced with strong linkages to these areas.

} Research Focus

Figure: GLMP Development Principles, 2021.

1.7.2. Data Collection instruments and limitations

Scope

This research is focused on the area designated as a potential growth node in the *Lanseria Regional Spatial Development Policy* (LRSDP, 2017), which is based on a 25-minute drive time from Lanseria International Airport. The proposed smart city development spans 53,311 ha and falls within three municipal jurisdictions: 42% within the City of Johannesburg, 38% within Mogale City Local Municipality, and 20% within the City of Tshwane.

The central objective of the research is to develop an understanding of how the concept of the smart city is being interpreted and applied within the South African context, particularly through the lens of the Greater Lanseria Masterplan (GLMP). This includes unpacking the smart city as an emerging urban planning paradigm, assessing its alignment with South Africa's developmental priorities, and examining its implications for spatial justice.

Zandspruit Township is used as a critical reference point for evaluating the inclusivity and social responsiveness of the smart city vision. Though not located within the immediate Lanseria node, Zandspruit represents a community on the urban periphery often cited as a potential beneficiary of large-scale infrastructure-led developments. Its inclusion offers a grounded comparison between policy-driven spatial visions and the lived realities of historically marginalised communities.

The research adopts a qualitative approach, drawing on participant observation within the “smart city” ecosystem in South Africa—spanning academia, government, and the private sector. Particular emphasis will be placed on engagements with the Greater Lanseria Masterplan project team (GAPP) and other stakeholders actively involved in shaping or critiquing the smart city agenda. In this context, “community engagement” refers to the researcher’s immersion within the planning and policy-making community, exploring how decisions are made, communicated, and contested. Ultimately, the study seeks to evaluate the appropriateness and responsiveness of current smart city planning models to the socio-spatial challenges faced by previously disadvantaged communities.

Desktop Review

The research will involve a review of policies, reports and frameworks that address the main socio-economic challenges of residents in Zandspruit and the City of Johannesburg regions. National and provincial policies will also be reviewed to analyse the alignment of policy strategies of the local area to the national and provincial policies.

Literature Review

The research will review literature on development strategies based the rational comprehensive planning approach in the South African Context. It will also analyse literature on smart city implementation strategies to understand the current debates and understanding of the phenomenon. This will help provide the foundation towards understanding the manner in which the Greater Lanseria Masterplan approaches socio-economic development.

Maps and Statistical/GIS Data

The research will rely on census data and other South African data sources for demographical data of the Zandspruit township and the Greater Lanseria region. Maps will be used to graphically represent the data where relevant, to understand the socio-economic conditions of the Greater Lanseria region.

Limitations

The research methodology will primarily rely on the analysis of planning documentation, policy documents, and participation in general smart city-related conferences and webinars. All of these have the potential to provide the key into developing an understanding of how practitioners understand and interact with the smart city as a new planning model or an emerging paradigm. However, this methodology might be percieved by some as being a mere desktop approach, supplemented by a few short follow-up interviews and observational notes. All these might be unlikely to yield empirical insights necessary to answer the main question.

Additionally, this short mini-research report was presented with time contsraints that limited the researcher, particularly in substantially engaging with the Zandspruit community. It was challenging to establish contact with appropriate people for interview purposes, especially within the Zandspruit community. This forced the research to rely on existing statistical data in order to create a socio-economic profile of the area, as well as the presentation of research findings from PARI, a well established organisation that had the required resources to substantially engage with the Zandspruit community regarding the GLMP. Additionally, the findings on socio-economic data might be inaccurate in some instances, as some statistical

data may be outdated. All this risks producing a commentary on planning rhetoric, rather than creating an evidence-based study on the socio-economic implications of the Lanseria Smart City on the Zandspruit community.

However, considering the fact that the development is in it's early inception stage, with the team responsible currently reviewing the initial comments after the publication of the first draft of the GLMP, the analysis of the masterplan and its possible implications will be based on speculative analysis and largely commentary in nature. As such, the analysis of the GLMP is based largely on planning rhetoric rather than planning practice.

1.7.3. Ethical Considerations

There are a few ethical considerations that need to be addressed to ensure the study is not biased and does not cause any harm to potential participants. These are listed and elaborated upon below:

Community Engagement and Participation

Engaging with the local community in Lanseria might be required in order to ensure that their perspectives, needs, and concerns are considered. However, the proposal study area is predominantly undeveloped and is mostly characterised by Industrial sites, business estates and business parks (Limbro Business Estate and Longmeadow Business Estate), and an industrial suburb (Kya Sands). This might result in the reliance on observation studies to identify key stakeholders who might be affected or have vested interest in the Development of Lanseria Smart City. Insights will be gathered through reviewing existing reports, plans, and participant observation studies, to gather their insights, perceptions, and expectations regarding the proposed development.

Conflict of interest

There would be a need to maintain objectivity and integrity of the analysis in cases where there is a conflict of interest during the data gathering stage, which could influence the research findings.

Non-Maleficence

The research will strive to maximize the benefits of the study while minimizing harm to participants and the community by considering the potential social and economic impacts of the proposal.

Data Management and Security

This research requires the development of robust data management protocols to ensure the security, integrity, and accessibility of the research data. This will require the researcher to adhere to relevant data protection regulations and ethical guidelines.

1.8. Provisional list of chapters

Chapter 1: Introduction and Background

Chapter 2: Literature Review

Chapter 3: Research Methods

Chapter 4: Context

Chapter 5: Research Findings

Chapter 6: Discussion of findings and Conclusion

Chapter 2: Literature Review

2.1. Introduction

This chapter provides a theoretical framework to assist in understanding the smart city approaches to city development. It discusses definitions, characteristics, and functions of smart city planning strategies, which underpin smart city typologies. Examples of smart city strategies will be provided. This will be followed by a brief explanation of smart city typologies and background of the implementation of the *'smart city approach'* in South Africa. A brief explanation of the planning strategy underpinning the Greater Lanseria Masterplan (GLMP) is outlined. Finally, a conceptual framework and concluding remarks will be outlined thereafter. The conceptual framework presented in this chapter suggests that the urban development strategy chosen for the creation of smart cities plays a crucial role in determining the resulting smart city typology and its relevance to the context in which it is being applied.

2.2. The Smart City Concept

The smart city approach has gained global popularity as a solution for urbanization, economic growth and environmental concerns (Gracias, et.al., 2023). This is because urban development has increasingly become focused on sustainable development and balanced growth (Wataya and Shaw, 2019). Although cities have always been impacted by technology, the smart city appraoch has become a widely accepted concept, often championed by institutions as part of their enhancement and investment policies (Willies and Aurigi, 2020). It emerged in the mid-2000s as an approach proposed to resolve urban governance challenges (Balkaran, 2019). While this concept promises increased urban efficiency and the potential to help cities become more inclusive, resilient and sustainable, there has been much debate on the challenges and opportunities that smart cities may bring (Allam and Newman, 2018). Given the challenges brought by previous planning approaches, understanding socio-economic implications of the smart city concept is an important field that needs to be explored (Willies and Aurigi, 2020).

2.3. Smart Cities: Definition and Strategies

The smart city approach is described as an urban development model based on "the utilization of human, collective, and technological capital for the enhancement of development and prosperity in urban agglomerations" (Angelidou, 2014: 53). Balkaran

(2019; 4) defines a smart city as "a municipality that uses Information and Communications Technology (ICT) to enhance the quality and performance of urban services such as energy, transportation and utilities, in order to reduce resource consumption, wastage and overall costs". Smart Cities "combine their objectives to enhance the quality of life, adopt ICTs in urban systems, implement new governance and focus on human capital and sustainability"(Desdemoustier, Crutzen and Griffinger, 2019: 2). The smart city concept remains a *'fuzzy concept'* with varying definitions and applications (Desdemoustier *et.al.*, 2019). However, one can deduct from the definitions that typical smart city developments are characterized by involving a combination of 'smart infrastructure', 'innovative technologies' and the use of 'soft/intangible assets' to create an effective integration of the changes within each urban community (Wataya and Shaw, 2019). As such, Angelidou (2014; 1) categorizes current smart city developments and policies into four strategic choices, based on "recent smart city literature and experience". However, Angelidou's (2014) categories are arguably better described as dimensions and as the boundaries of the different categories overlap in places and there are cases where cities possess characteristics that fall in multiple categories.

2.3.1. National and/or Local Strategies

Angelidou (2014) identifies a major characteristic of smart cities as being concerned with scale. This means that smart city strategies can range from a national scale where the strategy is concerned with an entire country or on a local scale such as a metropolitan area, a neighbourhood or city-region. While most strategies are developed on a local level, there have been cases of national level smart strategies. An example is the Smart Island Strategy for the Island country of Malta. The Government of Malta commissioned a national ICT strategy to place the country as '*one of the top 10 information societies in the world'* (Urenio Research, 2015). The strategy would be used to create a 'knowledge-based economy' and promote job creation within the high-tech/creative industry (Urenio Research, 2015). Similar strategies have been developed in countries such as Cyprus, Finland, and Singapore. Smart strategies on a national scale are mostly developed for countries that are geographically small and can be compared to large cities or metropolitan regions (Angelidou, 2014).

Local-level smart city strategies are the most common in urban development projects (Angelidou, 2014). They have become more popular due to their promise to provide solutions to the challenges brought by increasing urbanization and the need to maintain sustainability (Allam and Newman, 2018). "Cities incorporate ICT to enhance the quality and performance

of urban services and reduce resource consumption” (Balkaran, 2019; 4). When applied correctly, they provide cities with the capability to engage various constituents during the innovation process, resulting in the establishment of smart city ecosystems. They can also help foster a competitive economy allowing cities to become more flexible in exploring and 'adjusting to a variety of business and governance models' (Angelidou, 2014; 3). An example of a local strategy is Amsterdam's smart city strategy, referred to as the Amsterdam Smart City Program, which was initiated in 2007 (Mora and Bolici, 2017). The smart city projects in Amsterdam are mostly geared towards reducing energy consumption and carbon emissions. The initiative was developed through a collaboration between the Amsterdam Innovation Motor, the energy network Liander, researchers and the residents, as well as the city's municipal administration (Mora and Bolici, 2017; 255).

Through political commitment and a clear vision, Amsterdam has been successfully transformed into a smart city that uses ICT to help the city resolve environmental challenges and build a sustainable urban environment (Mora and Bolici, 2017). Projects completed include the West Orange Project which aimed to reduce energy consumption by 14%, as well as the Climate Treet Project which ran from 2009 to 2011 (Angelidou, 2014, 6). The city has received international recognition as "the world's most successful smart city initiative "(Angelidou, 2014; 6).

2.3.2. Hard and/or Soft Infrastructure strategies

The second major characteristic of smart city development strategies is infrastructure investment. This refers to strategies targeting 'the efficiency and technological advancements of the city's hard infrastructure system' or investments on intangible/soft assets (Angelidou, 2014; 5). Hard infrastructure includes the strengthening or investment on infrastructure systems such as waste management, water, transport and energy. An example can be found in the development of two 'smart city operations centres’ in Rio de Janeiro and Brasilia, Brazil (Gaffney and Robertson,2018; 7). Brazil's federal government developed two Integrated Centres of Command and Control (CICC) as part of the preparation for hosting the 2013 FIFA Confederations Cup, the 2014 FIFA World Cup and the 2016 Olympic Games (Gaffney and Robertson, 2018). The CICCs were used for the planning and operation of public security for the events (Angelidou, 2014). The centres were viewed as a major legacy of the World Cup.

Soft infrastructure orientated development is focused on social and human capital, knowledge creation, inclusion, participation, social equity and innovation (Angelidou, 2014). In Jakarta, the capital of Indonesia, the smart city approach is viewed as a tool to 'improve the well-being and quality of life of Jakarta citizen' (Nugraha, 2019). Digital technology is used as a tool to manage issues such as road congestion, local government service delivery, parking space, and school education (Nugraha, 2019). The smart city was established in 2015, and has a citizen centric online platform called Jaki, which serves as an official information centre that integrates various public services in Jakarta (Nugraha, 2019). One of the main challenges faced by the city is flooding. As a response to this, researchers developed a real-time map of flooding in the city, *PetaJakarta*, using crowdsourcing reports from Twitter (Saunders and Baeck, 2015).

Critics of the smart city approach have highlighted the need for smart city advocates to shift towards developing technologies that can solve pressing problems (Saunders and Baeck, 2015). When used effectively, soft assets can strengthen the ability of local governments to develop innovative solutions and 'create value', especially when they are optimized and aligned with the smart city's development goals (Wataya and Shaw, 2019). Smart cities have been criticized for placing too much value on ICT industries (Allam and Newman, 2018). The technocratic approach and the central position of private investors, private companies and politicians has been challenged by scholars (Desdemoustier *et. al*, 2018). This is because such an approach tends to dismiss the values and cultural and historical aspects that cities hold (Allam and Newman, 2018). As such, scholars as Allam and Newman (2018: 1) advocate for the need to develop smart cities “based on the dimensions of culture, metabolism and governance”. As a result, soft infrastructure oriented smart city approach is increasingly becoming an appealing approach to many municipalities.

2.3.3. Reference area: economic sector-based vs geographically based strategies

The third major characteristic of smart city strategies is their 'reference area' (Angelidou, 2014; 5). This refers to whether the strategies are economic sector based or geographically based. Economic sector-based strategies are concerned with the transformation of specific economic sectors of a specific city while geographically based strategies are concerned with geographically determined districts and clusters (Angelidou, 2014; 5). Cyprus's Island Smart City is a perfect example for an economic based smart city strategy. The city's economic base shifted from agricultural to light manufacturing and services, tourism, financial services and

real estate (European Smart Islands Forum, 2016). Key priority areas for Cyprus are highlighted in the Smart Specialization Strategy 2030.

With the tourism, finance and real estate sectors being the most important sectors in the economy of Cyprus, the island aims to add the energy sector as a new source of growth generation (European Smart Islands Forum, 2016). This is due to the discovery of natural gas reserves in the island's Exclusive Economic Zone. In its effort to become "a regional energy hub in the Eastern Mediterranean", Cyprus's island smart strategy is based on its focus to increase local capacity for development, financing and implementing Energy Efficiency (EE) and Renewable Energy Sources (RES) (European Smart Island Forum, 2016; 29).

An example of a geographically based smart city is found in Greece. The city of Thessaloniki's 'Intelligent Thessaloniki' proposal focuses on five key strategic areas described as 'the most important districts of innovation and entrepreneurship' (Angelidou, 2014; 7). These are (i) the port, (ii) central business district, (iii) Aristotle University of Thessaloniki campus, (iv) technology district and (v) the airport area (Angelidou, 2014; 7).

Westraadt and Calitz (2018: 145) argue that while the integration of smart solutions aimed at eliminating systematic inefficiencies has gained traction over the past few years, the hype around smart city integration is "detached from existing integrated planning and management practices". These planning practices are rooted in complexity science and built upon decades of practice. Both the economic sector based, and geographic location smart city strategies can be associated with the Local Economic Development (LED) approach. Defined by Krumhols (1999: 83) as "a process by which local governments manage resources to stimulate private investment opportunities in order to generate jobs and taxes". LED strategies form part of the Integrated Development Planning (IDP) process in South Africa. LED has since evolved from an isolated local development intervention within cities to a mandated obligation for all local authorities in terms of the Constitution of South Africa (Rogerson, 2007). In this instance, smart city solutions should work to assist in integrated city planning and management practices within the framework of existing policies and tools for integrated decision making in cities.

2.3.4. Urban development strategies: new vs existing cities

The final characteristic identified by Angelidou (2014) is concerned with urban development. This means the tendency to develop new smart cities or incorporating smart infrastructure in existing cities (Angelidou, 2014). There have been contrasting views on whether urban

development strategies should be focused on the development of entirely new cities when there are already big cities that exist with many socio-economic, socio-spatial complexities. Smart City Copenhagen emerged from the city's ambitious vision to become the world's first carbon neutral capital by 2025 (Copenhagen Cleantech Cluster, 2017). To achieve this goal, the city has been determined to develop innovative solutions to manage service delivery (Petrea and Ursache, 2023). The city actively engages its residents in decision making processes, thus extending its initiatives beyond infrastructure investment and smart urban management tools (Petrea and Ursache, 2023). The city believes that doing this will help them in achieving a carbon neutral city and help improve the quality of life, innovation and create jobs (Copenhagen Cleantech Cluster, 2017).

An example of projects that have been implemented so far include the creation of Nordhavn, a sustainable neighbourhood housing around 40 000 residents and 'created a similar number of jobs' (Copenhagen Cleantech Cluster, 2017; 19). The neighbourhood development was a direct response to the city's strategy, which is to become the world's testbed for smart sustainable solutions (Copenhagen Cleantech Cluster, 2017; 19). It aims to turn itself into a 'living lab' for new innovative solutions. The city's collaborative approach has helped facilitate the development of "cutting-edge solutions to urban challenges and fosters a vibrant startup ecosystem focused on smart city innovations", states Petrea and Ursache (2023; 226).

There has been a rise in the development of new smart cities globally. National governments around the world "are investing in the potential of smart cities at an ever-increasing rate" (Saunders and Baeck, 2015;8). India and China alone currently have almost 300 smart city pilot projects (Saunders and Baeck, 2015;8). The Gujarat International Finance Tec-City (GIFT City) is currently being developed as a global financial and service hub in Gujarat, India (GIFT, 2009). The city will serve as India's financial administration, a "financial and technology gateway to India" (GIFT, 2009). The aim is to develop the city into a 'Greenfield Smart City with state-of-the-art infrastructure' and a globally recognized 'vertical city' (GIFT, 2009). The project has a dedicated website containing the masterplan, information about the projects and updates on the development's progress. The new city is 12 km from Ahmedabad and 8 km from Gandhinagar, and its total area is 886 acres (GIFT, 2024). The project has been included in India's Smart City mission statement, with Greenfield development set to introduce most of the smart solutions in the area (GIFT, 2009). The project has managed to attract investors and has become a sought-after destination for real estate development.

Currently GIFT has completed Phase 1 of infrastructure development and Phase 2 development has just kicked in (GIFT, 2009).

The development of a new smart city thus encompasses the incorporation of the first three smart city categories. The size and extent of the new development would need to be determined in order to prepare for the incorporation of hard infrastructure. Additionally, it would require investments on soft assets such as knowledge creation through public involvement and participatory processes during the development phase of the proposed smart city. The city would need to establish its own system of governance that is well integrated with its neighbouring or already existing administrative regions. Therefore, the culture and metabolism of neighbouring cities and communities, as well as that of the individuals that the new city aims to cater for needs to be considered. This would set the foundation for economic sector development strategies and geographical location of clusters within the city. As such, due to the fluidity of the concept, smart cities can be used to describe (a) a type of branding; (b) a portfolio of technologies that have applications in urban management; (c) or a diverse range of demands for cities and urban management to improve efficiency, quality of life, public participation etc. Thus, it can be argued the urban development strategy chosen for the creation of smart cities plays a crucial role in determining the resulting smart city typology and its relevance to the context in which it is being applied.

2.4. Smart City Typologies

Smart city typologies are based on the reasoning and urban development strategies of smart city approaches in specific territories (Desdemoustier et.al, 2019). They are often shaped by the smart city categories described on the previous section, which act as guiding principles of smart city developments. Scholars note the poorly investigated smart city dynamics and insufficient studies conducted to survey the comprehension and application of the smart city concept. Scientific analysis tends to focus on case studies of one or several smart cities or on smart city projects in one or several territories, as argued by Desdemoustier et.al (2019). However, there are five fundamental categories of smart city typologies. These smart city typologies are based on the reasoning of the technocratic and holistic approaches generated from multiple variations of the concept (Desdemoustier et.al, 2019). These categories offer an analysis grid of what constitutes a smart city as they offer a lense into how the smart city concept is tackled in various territories (Desdemoustier et.al, 2019: 131).

Technological/ technocentric

Technocentric smart cities are based on the notion that "a well-functioning infrastructure is necessary to become a smart city" (Desdemoustier et.al, 2019; 3). ICT, mobile, virtual and other forms of technology are prioritised. This type of smart city believes that smart technology and ICT has the ability to transform territories fundamentally, providing solutions to help people make intelligent and smart decisions (Desdemoustier et.al, 2019).

Human and Creative

This type of smart city places education and investments in human capital as an essential component of the smart city (Desdemoustier et.al, 2019). Such smart cities rely on creativity, human knowledge and participation to respond to societal challenges (Desdemoustier et.al, 2019; 3). In this way, the word 'smart' refers to the development of clever solutions by creative people (Desdemoustier et.al, 2019).

Institutional

Institutional based smart city typologies regard leadership, vision, organizational transition and legal and regulatory barriers as important features of a smart city (Desdemoustier et.al, 2019). Government support and policy lies at the centre of the designing and implementation of the smart city concept (Desdemoustier et.al, 2019). Government plays a central role in fostering 'collaboration, cooperation, partnership and citizen engagement' (Desdemoustier et.al, 2019; 3). The E-governance services are used to help reach these objectives and foster stakeholder engagement in decision-making and public services (Desdemoustier et.al, 2019).

Sustainability

The sustainable approach promotes the development of a green economy "that meets the needs of the present generation without compromising the ability of future generation to meet their own needs" (Desdemoustier et.al, 2019; 3). Smart city developments based on this principle integrate environmental protection with social and economic equity (Desdemoustier et.al, 2019).

Holistic

Holistic smart cities combine technology, human capital and creativity, with institutional factors such as sustainability (Desdemoustier et.al, 2019; 3). It suggests that when combined, these approaches can enable the development of "a smart economy, smart transport, smart environment, smart living and smart governance" (Desdemoustier et.al, 2019; 3).

2.5. South African cities: socio-economic challenges

Cities have struggled to maintain the balance between becoming economically competitive in the global economy and maintaining social cohesion and responsive governance (Turok, 2006). Increased globalisation has led to the intensification of international competitiveness, forcing governments to prioritise business demands, exclusive locations and flexible labour markets (Turok, 2006). On the other hand, increasing socio-economic inequality fuelled by unemployment and poverty increases the need for governments to roll out welfare services such as housing, basic service delivery and infrastructure to the poor and marginalized. Such challenges are predominant in South African cities following 'its re-entry into the global economy and its pursuit for its neo-liberal policies that have damaged jobs and income', (Turok, 2006; 2). The roll-out of political, civil and social rights to the previously disadvantaged majority has raised expectations of socio-economic progress. However, this has also highlighted the cultural, religious and class divisions prevalent in South Africa (Turok, 2006).

2.6. Smart cities in South Africa: The role of local government

South Africa's government role is to ensure that the country continues to run as a capable state. It is to assess, plan, develop and implement innovative programs that meet societal needs. The role of local government, as enshrined in Section 152 of the Constitution of South Africa (1996; 74), is set out through the five objectives of local government:

(a) Democratic and accountable governance;

(b) Sustainable provision of services;

(c) Social and economic development;

(d) A safe and healthy environment; and

(e) Community involvement.

Section 153, not 154, outlines the developmental duties: municipalities must structure their administration, budgeting, and planning to “give priority to the basic needs of the community” and participate in broader government programmes (Constitution of South Africa, 1996; 75). “Developmental duties of municipalities are to (a) structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community; and (b)

participate in national and provincial development programs.", as described in Section 154 of the Constitution of South Africa of 1996 (75).

The “success of smart cities depends on a capable government that can effectively adopt smart principles to respond to challenges" (Wilson and Guya, 2019; 3). As a key characteristic of smart cities, smart governance may offer a way to help governments deliver services or engage with civil society in urban development (Wilson and Guya, 2019). South African cities continue to face governance challenges, with service delivery worsening, and urban poverty and inequality increasing. Therefore, the importance of smart cities in South Africa depends on effective local governance (Wilson and Guya, 2019).

2.7. The Greater Lanseria Master Plan (GLMP).

The Draft GLMP is an outcome of extensive studies conducted by the Office of the Premier in collaboration with private sector consulting companies, GAPP Architects and Urban Designers, SMEC, PWC, Seaton and Khare (2020). The master plan was a response to the State President, Cyril Ramaphosa's introduction of “the smart city initiative in his State of the Nation Adress in February 2020” (GAPP *et.al*., 2020; 12). The masterplan is underpinned by the “Lanseria Regional Spatial Development Policy (LRSDF) of 2017, a policy that intends to guide planning in the Greater Lanseria area” (Office of the Premier *et.al*., 2020; 19). The vision of the masterplan is "*to be a truly post-apartheid city based on best practice in terms of urban sustainability and the principles underpinning the smart city*", (GAPP, *et.al*., 2020; 12). This “*vision is encapsulated in the acronym TRAM –Transformation, Re-industrialization and Modernization*” (Office of the Premier, *et.al*., 2020; 12).

2.7.1. Lanseria Smart city development strategy smart city approach

In developing countries such as South Africa, there has been a growing desire to develop new smart cities, designed from scratch with the intent to showcase cutting edge smart technology (Angelidou, 2014). Lanseria Smart City is based on the urban development strategy that supports the development of new intelligent cities. This highly ambitious project requires a tremendous amount of investment from various stakeholders to acquire land, build new infrastructure and develop new large-scale settlements. The GLMP adopts a holistic smart city development approach which involves combining technology, “human capital and creativity with institutional factors for sustainable development” (Desdemoustier, *et.al*., 2018; 131). Holistic thinking is a guiding principle for the proposed project. This is because the masterplan recognizes that the important aspects of a city economy lie not only on its

infrastructure investments, but also on urban sustainability and "*the inclusion of myriad upstream and down-stream aspects of its economic chain"* (Office of the Premier *et.al*., 2020; 14). Holistic thinking is viewed as a way "to keep future thinking open-ended enough as we move to 'leading edge' approaches that embrace very exciting, rapidly evolving innovation" (Office of the Premier *et.al*., 2020; 14).

2.7.2. GLMP guiding principles

The GLMP aims to promote the development of an inclusionary economy by developing a city governed by the five-minute and ten-minute walking isochrones (Office of the Premier *et.al*., 2020). Through creating a walkable city by creating a complex mix of urban land uses, the city will reduce the reliance on private and public transport. The **live, work and play** principle is encouraged through mixed-use development as well as through horizontal and vertical development. This type of urban intensification will form the basis for **sustainability**, a second guiding principle in the masterplan. **Socio-economic integration** is another principle that the master plan intends to address using **compact and complex development**. This involves the promotion of residential integration and allowing the city to embrace diversity and allow for the city to naturally grow its economic base instead of relying on planning "*having to misdirect itself with the social engineering of spatial separation and division*" (Office of the Premier *et.al*., 2020; 13). **Incrementalism** is viewed as an appropriate planning approach to city development due to the need to plan for thresholds and manage risks is acknowledged.

2.8. Conceptual framework

The urban development strategy chosen for the establishment of smart cities plays a crucial role in shaping both the typology of the city and its relevance to the specific context in which it is applied. For any development strategy to be meaningful, it must be grounded in an understanding of the everyday challenges experienced by people who live in, travel through, and work in the city. These experiences provide insight into the kinds of interventions that may be necessary and appropriate, rather than relying solely on abstract or globally imported solutions. While the smart city model is often presented as a response to the complex challenges brought about by rapid urbanisation, its success ultimately depends on the value it brings to those who live in the city — and on how that value is understood, distributed, and measured. It becomes

important to consider the technical and organisational implications of such developments: how people's lifestyles may be affected, what new costs may arise, and whether existing institutions will need to be restructured or completely reimagined. In many cases, new departments, partnerships, or ways of operating may need to be created to manage and maintain these smart systems.

The establishment of a new smart city in South Africa, particularly one as ambitious as the proposed Greater Lanseria development, requires significant investment from a range of stakeholders — all of whom come with different motivations. The need to cover infrastructure and development costs often leads to joint planning initiatives, which, while necessary, may prioritise the goals of certain actors over others. As such, the cultural and historical dynamics of the area, as well as the current urban metabolism of the Greater Lanseria region, need to be carefully considered (Allam and Newman, 2018:5). Without this, already rooted in the space. Globalisation and the pressure it places on cities to

compete internationally have further influenced how urban space is imagined and planned. In many instances, governments are required to respond to market demands, making room for exclusive locations, private investment, and flexible labour markets. These pressures shape how cities grow and who they are ultimately for. If not actively addressed in the implementation phase, such dynamics can produce cities that are technologically advanced but socially disconnected — built for efficiency and surveillance, rather than inclusion and access.

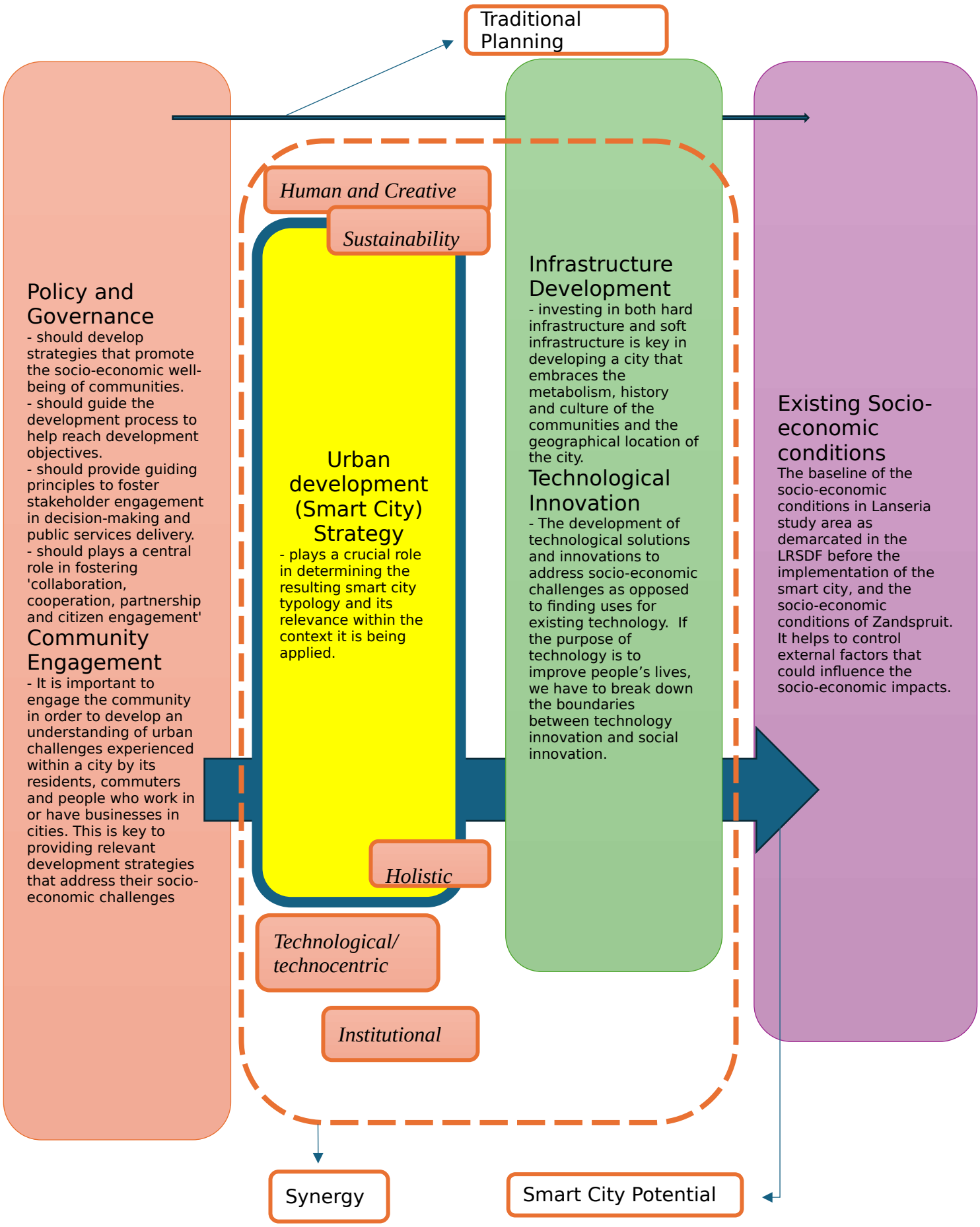


Figure: Conceptual Framework

When private returns on investment become the driving logic behind development, the resulting city may become unaffordable to most, reinforcing patterns of exclusion and inequality. In this context, the smart city risks becoming another layer in the reproduction of spatial segregation, rather than a tool to overcome it. It is therefore necessary to constantly reflect on whether the current planning models being applied are appropriate to the social and economic realities of the South African urban condition, and whether they genuinely speak to the needs and aspirations of those often left at the margins of large-scale urban transformation.

2.9. Conclusion

Cities are struggling to maintain the balance between becoming economically competitive in the global economy and maintaining social cohesion and responsive governance (Turok, 2006). Although cities have always been impacted by technology, the smart city concept has become a widely accepted concept, often led by institutions as part of city expansion and investment policies (Willies and Aurigi, 2020). Critics of the smart city approach have highlighted the need for smart city advocates to shift towards developing technologies that can solve pressing problems (Saunders and Baeck, 2015). As such, smart city development policies are shaped by the factors which influence the strategic choices guiding smart city developments. The success of smart cities is determined by “a capable government that can effectively adopt smart principles to respond to challenges" (Wilson and Guya, 2019; 3). The development of the Lanseria Smart City necessitates substantial financial investment to cover both capital and operational costs. Given that investors typically seek returns on their investments, this may result in the creation of an urban environment characterized by high living standards, advanced technological infrastructure, and elevated costs—potentially rendering it unaffordable for lower-income populations. Such a trajectory reflects the principles of neoliberal urbanism, wherein market-driven development strategies prioritize urban efficiency and competitiveness, often at the expense of social equity. Consequently, this approach risks reproducing historical patterns of spatial injustice and perpetuating socio-economic inequalities.

Chapter 3: Research Methods

3.1. Introduction

Traditional participation observation research, a concise form of ethnographic inquiry, is used at the exploratory stages of research “to investigate either a new topic, culture, venue or behaviour” (Guest, Namey and Mitchell, 2013; 82). It is also very useful in examining topics that already have a considerable body of knowledge and capturing real-time stakeholder interactions with digital services (Guest *et.al*., 2013). Chapter 3 will first justify the appropriateness of this method in addressing the stated research questions. It will then delineate the procedures for data collection, management, and ethical oversight. Finally, the chapter will define the methodological scope and acknowledge any attendant limitations.

3.2. Approach/paradigm

Regarded as one of the major approaches of qualitative research, ethnography originates from the discipline of Anthropology (Sharma and Sarkar, 2019). Ethnographic studies are defined as qualitative studies that “*aim to provide an in-depth description of a group of people or community*” (Mouton, 2021; 149). “*Such descriptions*”, as explained by Mouton (2001; 149), are "*embedded in the life-worlds of the actors being studied and produce insider perspectives of the actors and their practice*". Ethnographic studies are carried out either through participant observation studies or case studies. Culture lies at the centre of ethnographic research, which is why one of the main questions raised from this type of study have to do with characteristics of a group or individuals (Sharma and Sakar, 2019). In this instance, culture may refer to " *a combination of various types of knowledge, believe, custom, art, moral,laws, habit, attitude of mind, the pattern of human activity, literature, language, religion, religious activity,... continuous process, accumulative, inter connected with each other, changing and dynamic, vary from one society to other society etc*" (Sharma and Sakar, 2019; 1). Ethnographic research allows the researcher to search very complex or complicated design or planning challenges.

This research aims to make use of participant observation to explore the ‘smart city concept’ and the manner it is understood in academia and in practice. It adopts a qualitative approach, drawing on participant observation within the “smart city” ecosystem in South Africa, spanning academia, government, and the private sector. This will be done in order to develop a sense of their application in South Africa and allow for the evaluation of the Greater Lanseria Masterplan, which currently proposes the development of the Lanseria Smart City.

Participant observation studies are usually not as lengthy as ethnography, are conducted in unfamiliar locations and are less comprehensive in scope (Guest *et.al*, 2013). In addition, participant observation allows researchers to develop a connection with the most basic human experiences. Such a connection, discovered either through immersion or participation or both, enables the researcher to learn what it means to be a member of a particular community (Guest *et.al*, 2013). However, harnessing the capability for participant observation in a more formal sense can be challenging, as this requires the researcher to synthesize and organize an inherently fluid process (Guest *et.al*, 2013; 75). This requires the use of data collection tools such as taking notes, audio or video recordings, "*taking images and asking follow-up questions that are designed to uncover the meaning behind some processes or behaviours*" (Guest *et.al*, 2013; 75). These are the research tools that this research relies on to understand the current engagements on the 'smart city concept' within the smart city ecosystem in South Africa, and more specifically, to understand the process behind the creation of Lanseria Smart City. Particular emphasis will be placed on engagements with the Greater Lanseria Masterplan project team (GAPP) and other stakeholders actively involved in shaping or critiquing the smart city agenda. In this context, "community engagement" refers to the researcher's immersion within the planning and policy-making community, exploring how decisions are made, communicated, and contested.

3.3. Question Analysis: The main socio-economic challenges faced by Zandspruit residents?

In order to develop a socio-economic profile of Zandspruit, this research engaged with statistical data gathered through population census from Stats SA, as well as data gathered by Plan Associates Development Planners for the Johannesburg Development Agency (JDA), one of the CoJMM entities, for the Draft Zandspruit Urban Development Framework (ZUDF). As such, data regarding population demographics, housing typologies, household income, employment and occupation profile, as well as employment per industry was analysed. This was done to uncover socio-economic challenges such as low household income, overcrowding, informal employment, predominant in the area. Spatial analysis was done through collecting data from the CoJ property website and the draft ZUDF to analyse the land use zoning, existing land uses, the institutional and cadastral structure, as well as environmental features found within the study area. This was followed by a review of national, provincial and local municipal policies that address socio-economic challenges related to communities like Zandspruit. These include reviewing the Spatial Planning and

Land Use Management Act no 16 of 2013 (2013), chapter 3 and 8 of the National Development Plan 2030 (2013), the ‘National Spatial Development Framework (2022), the Integrated Urban Development Framework (2016), the Growing Gauteng Together 2030 (2013), the Gauteng Spatial Development Framework 2030 (2022), the City of Johannesburg Integrated Development Plan 2021-26 (2021), the City of Johannesburg Spatial Development Framework (2021)’, as well as the Draft ZUDF (2024). This has been done to assess the manner in which policy addresses socio-economic challenges and the extent to which policy relevantly addresses challenges faced by communities such as Zandspruit Township.

3.4. Question Analysis: The principle of concentration, underpinning the compact city approach used as a strategy for socio-economic development in the GLMP, relevantly address these socio-economic challenges?

The principle of concentration is listed among one of four integral principles of composition and planning in the formation of atrium spaces. Defined as a large open-air or skylight spaces surrounded by buildings, atrium spaces are formed as centres for social activity. The principle of concentration is characterised by the "compaction of 3-dimentional and planning structures of the space, bringing in order and achieving functional saturation of narrow interior spaces of urban blocks and completeness of the 3-dimensional-spatial solution" (Solobay and Vakhnichenko, 2020; 3). The principle of concentration therefore enables “the enrichment of the object-spatial environment within a certain local zone of the built-up area" (Solobay and Vakhnichenko, 2020; 3). By concentrating activity nodes, the Masterplan aims to reduce travel costs and spur local job creation. The Lanseria Smart City initiative “makes use of four overarching principles along with eight associated goals” (Office of the Premier *et.al*., 2020; 13). Out of the four, the principle of concentration is applied to help create "a well-defined spatial structure that connects people and places and strengthens the region in order to facilitate economic growth and opportunities" (GAPP *et.al*, 2021; 19). The goal is to develop a polycentric region linked to economic centres. This means that the initiative aims to make use of planning efforts that concentrate development and create a clear hierarchy with the belief that this will maximize planning efficiency, reduce urban sprawl and increase open space reserves (GAPP *et.al*, 2021; 19). This research makes use of a literature review of academic writings relating to the principle of concentration as a means to stimulate economic development and social cohesion. The academic literature will be gathered through journal articles as well as books on urban concentration as a development principle.

More information on the application of the principle of concentration will be gathered through an in-depth analysis of the Greater Lanseria Masterplan. Journal articles will be accessed through the University of the Witwatersrand online library containing databases for academic literature. Therefore, the journal articles will be accessed through Web of Science, Sabinet available through the Wits library. The policy documents will be analysed through a comparative matrix, assessing how each policy addresses the socio-economic challenges in the Zandspruit community. The literature reviews will help assess how theoretical concepts are translated into actionable goals and objectives within the policy documents. In addition, more data will be gathered through participant observation studies involving the attendance of bi-weekly progress meetings organised by the planning team that was appointed for the Lanseria Smart City initiative. This, in addition to the attendance of smart city conferences and webinars, will allow for the understanding and interpretation of the principle of concentration as a means to foster economic development both in research and in practice. Through participant observation, the research aims to develop a connection with the basic day-to-day activities of the planning and preparation for the implementation of the Greater Lanseria Masterplan. Taking note of how planners may present idealised versions of "concentration", semi-structured interviews were carried out with three individuals, one following the smart city conference, and two with municipal officials for clarification purposes regarding a few concerns raised during the bi-weekly progress meetings carried out by the project representatives.

3.5. Question Analysis: Implementation structureproaches – governance, coordination, finance, and digital-service delivery – will best translate the masterplan's objectives into tangible outcomes for Lanseria Smart City?

The smart city approach is well-recognised for its wide range of principles which allow cities to flexibly tailor the approach to address their challenges (Wilson and Guya, 2020). Cities in South Africa are urged by scholars such as Wilson and Guya (2020; 3), to understand the smart city approach in order to respond to their local challenges, particularly, poverty, service delivery, inequality and poor technology. As such, this research makes use of information gathered through conference proceedings to understand the current thinking surrounding implementation strategies for smart city approaches in South African cities. The Bi-Weekly Progress meetings assisted in gathering insights regarding the implementation structures and budget planning for the implementation of the Greater Lanseria Masterplan. More conference papers and reports relating to the smart city concept in South Africa were reviewed to work

towards understanding of the potential implications of smart cities in South Africa. Such information was gathered from the Wits Library (Web of Science, Sabinet) and organisations such as the South African Cities Network, sites that currently provide cutting-edge practitioner insights, to question the value of smart cities in comparison to the pressing challenges faced by South Africans such as service delivery, particularly water and electricity, as well as housing and the widening poverty gap (South African Cities Network, 2020).

3.6. Sampling

The research adopts a qualitative approach, drawing on participant observation within the "smart city" ecosystem in South Africa—spanning academia, government, and the private sector. As such, the research will be conducted through attending a smart city conference, a smart city webinar and two bi-weekly progress meetings arranged by the representatives of the GLMP, the GAPP Team. The bi-weekly progress meetings were conducted online through Microsoft Teams. The Africa-US Smart Cities Lab Conference was the first that was held as part of the Africa-US City Relations Project. The project is one of the flagship projects that was established as a centre of knowledge production and policy outreach by the African Centre for the Study of the United States at Wits University. The conference outlined the opportunities, challenges and potential that smart cities may offer, making reference to Waterfall City, Steyn City and Itana. The Africa-US Smart Cities lab also hosted a webinar on the 17th of October 2024 in commemoration of Urban October. It was also hosted as a response to the call by the UN-Habitat, to encourage organisations, communities, cities and government to focus their efforts on urban issues and sustainable development (Africa-US Smart Cities Lab, 2024). The conference primarily focused on enlightening communities about the transformative potential of implementing smart cities in Africa, and their role in achieving Sustainable Development Goals (SGD) goals. Follow-up semi-structured interviews were then conducted for further research following the conference, webinar and progress meetings. As such, interviews were organized with two public sector officials from the City of Johannesburg to gather more information regarding the GLMP and address some key challenges raised in the bi-weekly progress meetings. Another semi-structured was conducted with one private sector participant following their presentation on smart cities at the smart city webinar.

3.7. Limitations of findings

This research evaluates the extent to which the GLMP, which currently proposed the development of a ‘new smart city’, relevantly addresses the socio-economic challenges faced within the Zandspruit Township. It investigates the use of the principle of concentration as one of the key principles in achieving economic prosperity within the proposed Lanseria Smart City. It also attempts to investigate implementation structures, strategies or approaches that would determine the success of the masterplan. Therefore, the research outcomes should be interpreted within the context of the GLMP. The research outcomes are based on a proposed masterplan, which has not yet been implemented.

Participant observation studies are inherently qualitative studies that allow researchers to interact with and experience the cognitive elements, rules and norms underlying observable behaviours. The smart city concept is gaining traction within academia, in local municipaliies as well as in the private sector. This research, therefore, focuses on engagements within this community, to observe the manner in which it’s potential socio-economic effects are analysed and understood within this community. Poor response from the Zandspruit community leaders and non-profit organisations within the Zandspruit township resulted in minimal engagements from the Zandsprit community. The research required the development of a stronger approach to encourage engagement with the community regarding the Lanseria Smart City, as well as the existing socio-economic challenges faced by the community. Participant observation is a relatively unstructured form of ethnographic study which provides unique data, that is often free flowing with the analysis of the data much more interpretive than in direct observation. This data was crucial in understanding the relevance of the development of the Lanseria Smart City, given the challenges faced by existing local municipalities affected by this development.

Chapter 4: Context

4.1. Introductions

"*Many people in South Africa continue to live and work in areas influenced by colonial and apartheid spatial planning and land use practices*" (SPLUMA, 2013; 2). These spatial planning laws were "*based on racial segregation, racial inequality and unsustainable settlement patterns*" (SPLUMA, 2013; 2). The democratically elected ANC led government inherited the socio-economic imbalances and spatial challenges that resulted from apartheid planning (Jobo, 2014). Pro-poor and pro-growth development strategies were adopted since 1994, to reduce the inequality gap that persists in the country. While there has been significant progress made towards improving the quality of life, the government has yet to address the widening socio-economic inequality gap. Zandspruit Township bears much of the characteristics of segregationist planning policies, located at the periphery, with a large informal settlement that faces service delivery challenges and poverty.

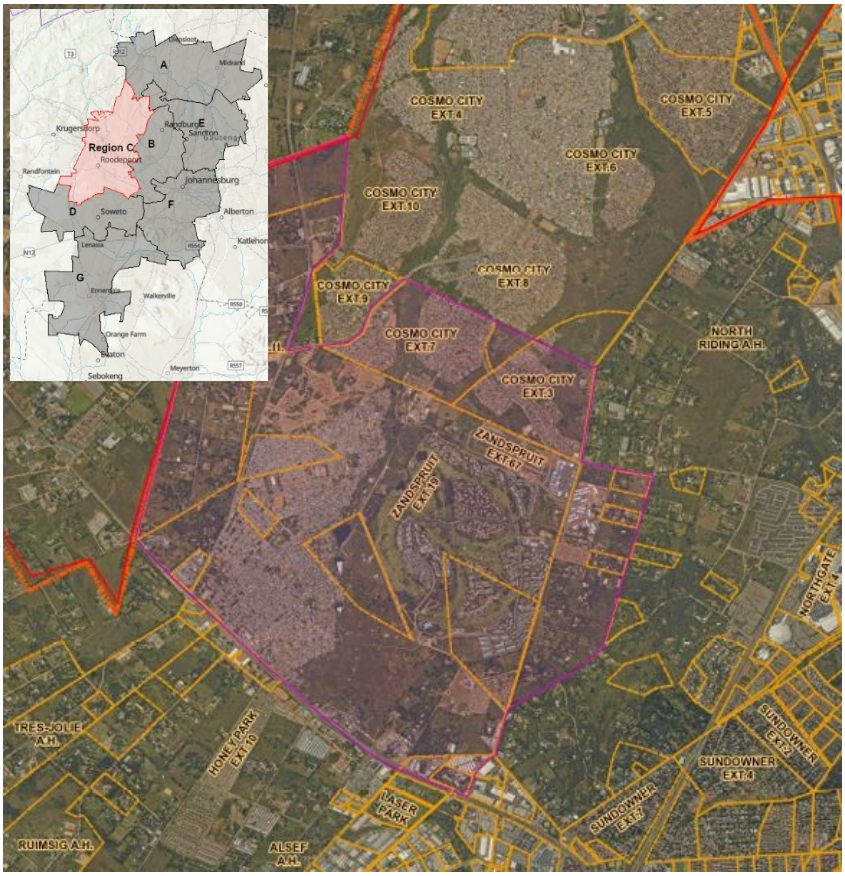


Figure 2: Zandspruit Locality within CoJMM

4.2. Locality

Zandspruit is located towards the northwestern edge of Johannesburg Region C. This region is well linked to 'Johannesburg Inner City, with Beyer's Naude, Malibongwe Drive, Ontdekkers Road, and Main Reef Road providing access to the rest of the city' (CoJMM, undated). These roads also "provide access to some of Gauteng's major attractions such as the Cradle of Humankind, Magaliesburg and Pilansberg" (CoJMM, undated). Also in this region is Roodepoort with surrounding

suburbs considered one of the most attractive residential areas in the Johannesburg metropolitan region. “Region C is also home to the University of South Africa's Florida campus and Australia's Monash University” (CoJMM, undated). It is well-served “by amenities, including shopping centres, schools, a museum and theatre, health facilities, country lodges, restaurants, sporting facilities and nature trails” (CoJ, undated). However, like most townships, Zandspruit is located on the outskirts of the city, a significant distance away from these commercial centres (Plan Associates Development Planners, 2024).

The Zandspruit Urban Development Framework aims to extend the township to include Wards 97, 134 and Ward 114. Thus, the data provided in this context analysis chapter will cover the area outlined as the Zandspruit Urban Development (ZUDF) study area, which includes all three wards. This area has a fragmented spatial structure with varying degrees of connectivity through local and regional roads that provide a connection to economic nodes. It is situated south of Cosmo City and to the immediate north of Roodepoort. The areas found within the Zandspruit study area are very different in nature (Plan Associates Development Planners, 2024). These areas are divided into three functional areas within the recently published Draft Zandspruit Urban Development Framework (2024).

- Functional Area 1: is mostly comprised of Agricultural Holdings and the Northgate Regional node and is recognized as a possible area for infill development.
- Functional Area 2: comprises of the Zandspruit Informal Settlement, Jackal Creek Residential Estate and Agricultural holdings located beyond the city's urban development boundary.
- Functional Area 3: is comprised of various residential and mixed-use areas close to and beyond the urban development boundary.

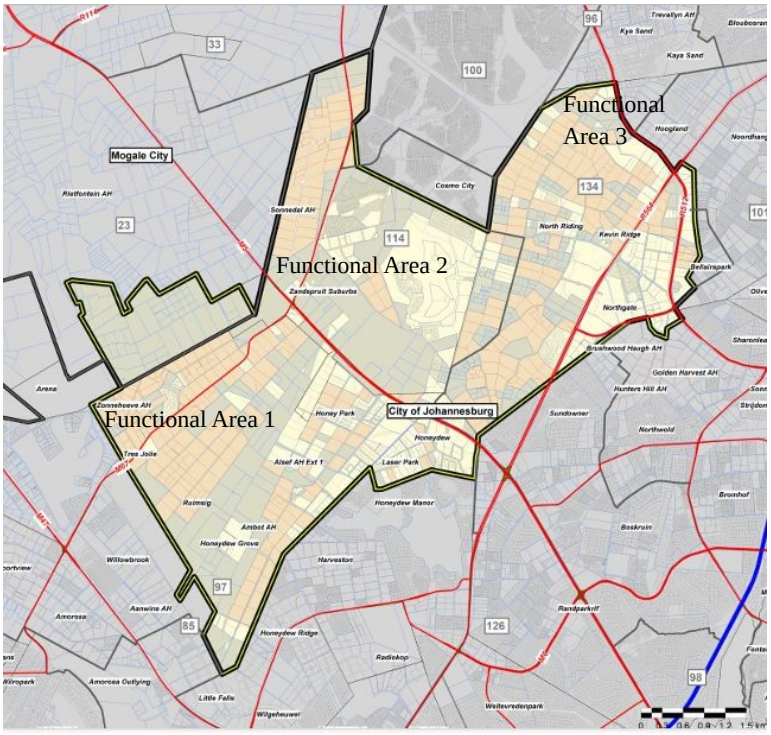


Figure 3: Zandspruit Urban Development Framework Study Area

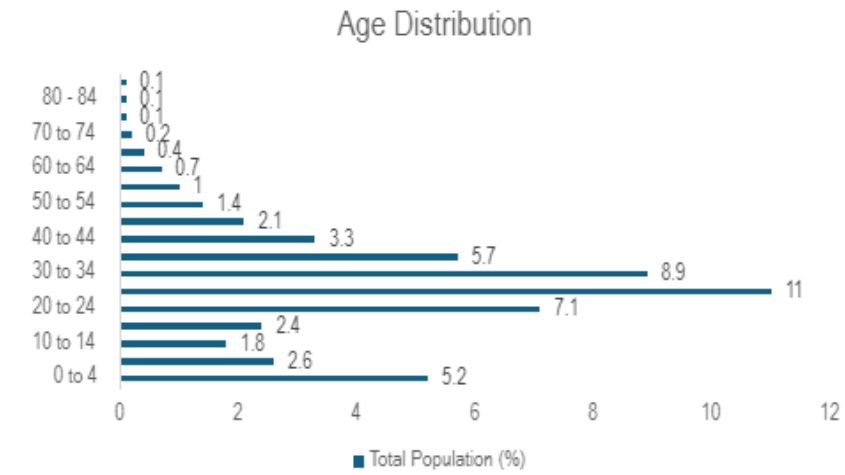
4.3. Situational Analysis

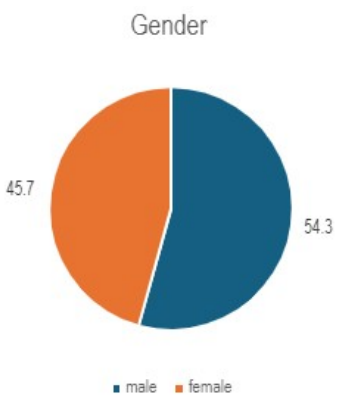
A situational analysis is defined as a process that focuses on developing an understanding of a community in relation to the local problem that a particular legislation, policy, framework or project aims to address (Grassroots Collective, 2018). It is a process that allows for the assessment of the broader societal context of a particular community, that is then applied to a said project or programme (Grassroots Collective, 2018). The purpose of this section is to analyse the Zandspruit Urban Development study area in order to understand the factors affecting the livelihoods of the broader Zandspruit community. This section will focus on understanding the broader socio-economic profile, population, employment, housing and education dynamics in the area. This will help provide an understanding of the current circumstances within the Zandspruit Urban Development study area.

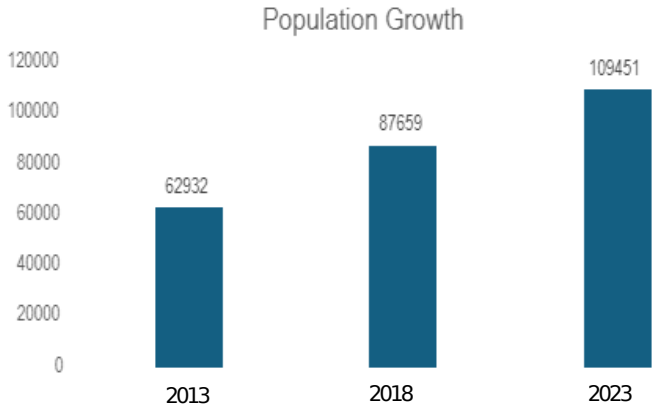
The analysis is done by looking at statistical data collected using Stats SA, CoJMM online maps and census data, as well as data collected by the JDA and the CoJMM for the Zandspruit Urban Development Framework (ZUDF). The socio-economic profile provided below covers the entire Zandspruit Urban Development study area, which contains three CoJMM administrative wards which are, Ward 97, Ward 114 and Ward 134. Zandspruit currently falls within administrative Ward 114, where most of the area is zoned Agricultural, with a few formally established Residential area towards the centre and the northeastern portion of the admin ward. The Zandspruit Informal Settlement is located within this ward. The data was obtained by DEMACON Economic and Demographic Profile, a private consultancy specializing in a variety of real estate and related commercial research services.

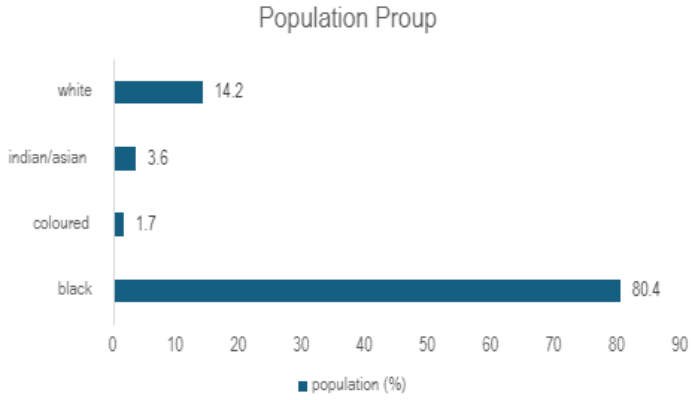
4.3.1. Population Demographics

Region C of the CoJMM “is the second largest contributor to the City of Johannesburg economy” (Plan Associates Development Planners, 2024; 39). The total population within the ZUDF study area stands at 109 451, with 45 952 households. The average population growth rate is 6,11% while the household growth rate is 7,77%, according to the data collected by the Plan Associates Development Planners (2024). Of the total population size in the area, the black African community is the largest at 80,4%, followed by the White community at 14,2%, the Asian/Indian community at 3,6% and the Coloured community being the minority at 1,7%. The male population is larger at 54,3% while the female population lies at 45,7%. The population is relatively young, with the largest population band, at 11% and 8,9% being the 25 to 29 and 30 to 34 respectively.









4.3.2. Education and Employment

Figure 4: Gender Distribution

Figure 5: Age Distribution

In terms of Education levels, most of the population has had access to education, with 36% having attended some secondary school and 29% having completed matric. Furthermore, 20,7% of the population received higher education. Out of the total that completed matric, 13,7% obtained matric through Adult Basic Education and Training (ABET). The labour force study within the study area revealed that 79,6% of the population are economically active. This describes the number of people of a working age between 16 and 65, who are either employed or unemployed. As such, 81,3% of the economically active population is employed while 18,7% is unemployed. In addition, 44,2% of the employed population are employed in semi-skilled occupation, 33,7% are skilled occupants while the remaining 21,3% are low skilled occupants. The data on employment and education in the study area is summarized below.

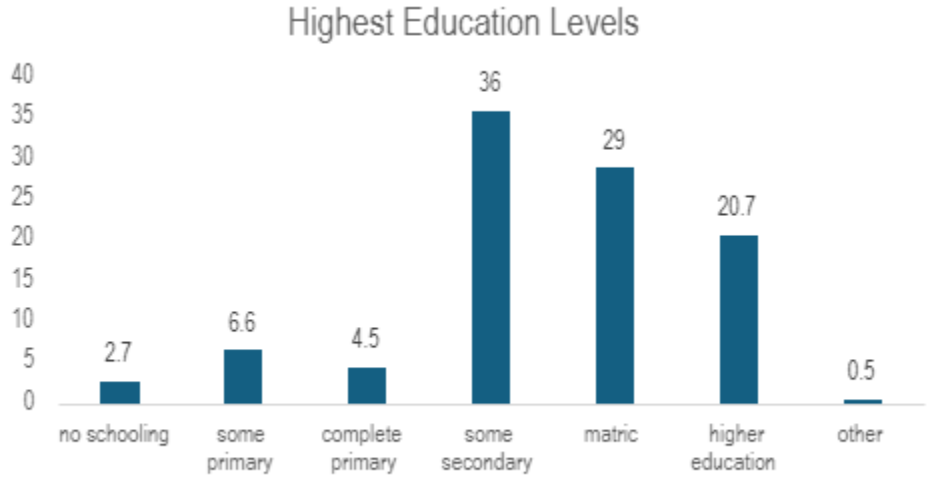


Figure 9: Higher Education Levels

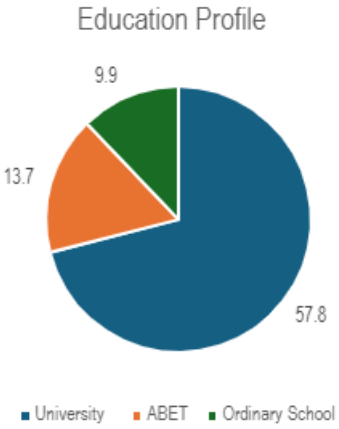


Figure 8: Education Profile

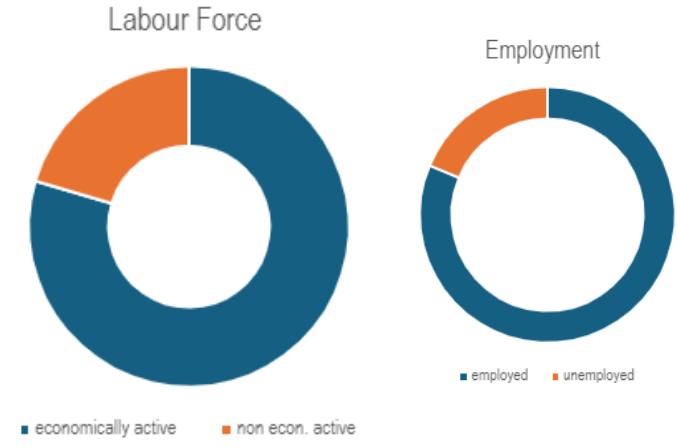


Figure 10: Labour force and Employment

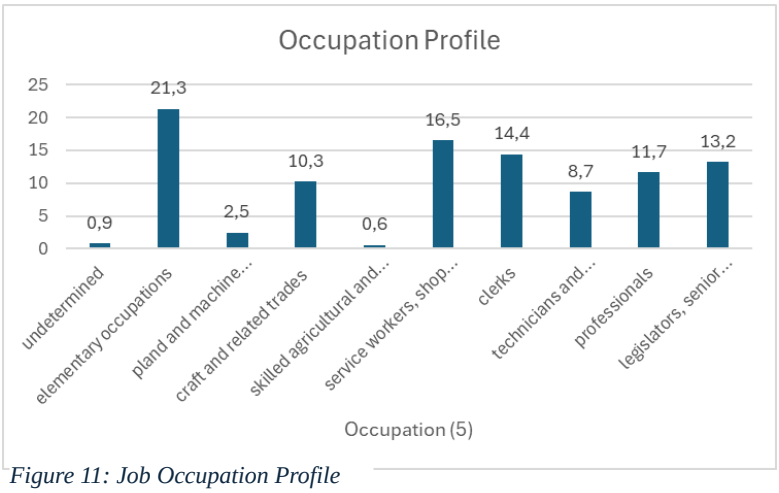


Figure 11: Job Occupation Profile

4.3.4. Household Profile and Economic Profile

The data revealed hat 57,8% of the population resides in formal dwellings and 41,9% reside in informal dwellings. Out of all households in the study area, only 1,7% of the households are considered high income households, with the low-income households forming the majority at 50% and 48,3% considered middle class.

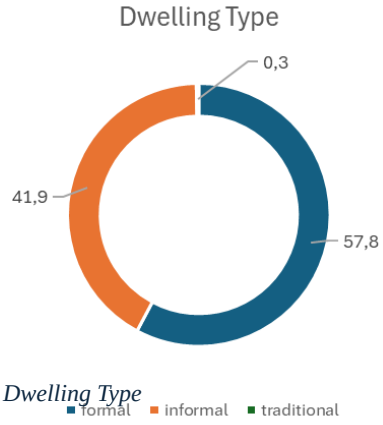


Figure 12: Dwelling Type

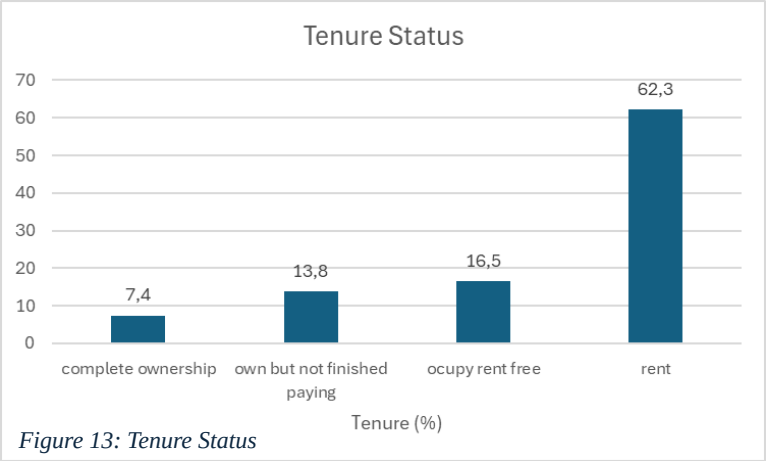


Figure 13: Tenure Status

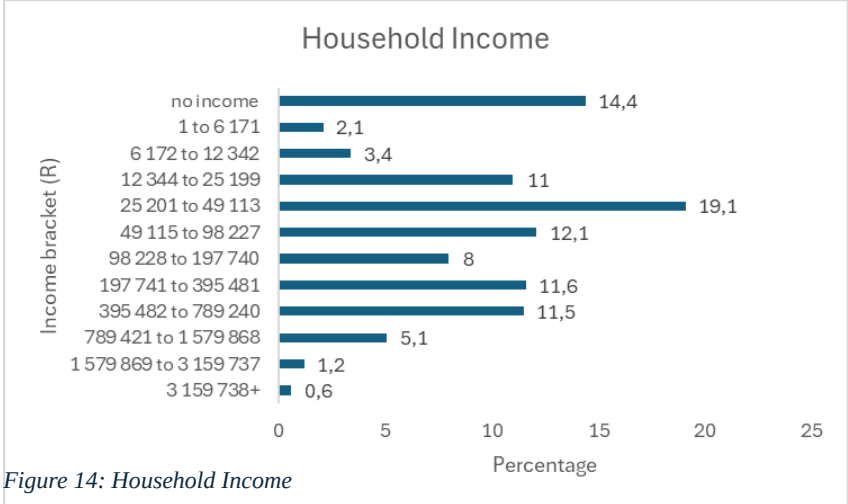


Figure 14: Household Income

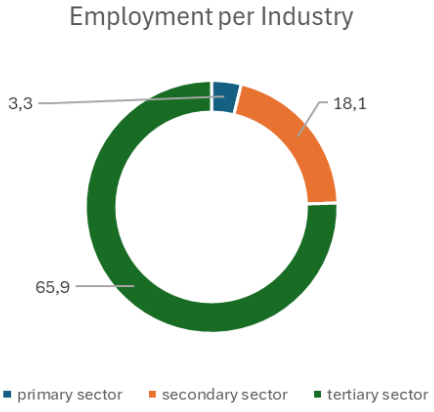


Figure 15: Employment per Industry

4.4. Spatial Analysis

Zandspruit is located towards the northwestern edge of the CoJMM (Plan Associates Development Planners, 2024). It is located west of the MCLM's eastern edge, near Factoria and Chamdor, Mogale city's largest industrial complexes (Plan Associates Development Planners, 2024). It is also located near the Muldersdrift area, which has a combination of

mining, industrial, business and prominent tourist activities such as wedding venues, restaurants and holiday resorts (Plan Associates Development Planners, 2024). Further north of Zandspruit is the Lanseria airport, which is surrounded by light industrial uses (Plan Associates Development Planners, 2024). The industrial uses around the airport include Kya Sand, Laser Park, Strijdom Park, Hoogland and the Northriding Industrial node. Most of the informal settlements are situated around the N14 and the R55 roads.

There are five main roads providing access into Zandspruit Urban Development Framework study area. Beyers Naude drive connects the area to the N1 road located towards the east as well as N14 located towards the west. Hendrick Potgieter Drive also links the site to the N1 and N14 highways and allows access through the western portion of the study area. Malibongwe Drive passes through the eastern portion of the study area and extends towards Hartbeespoort Dam towards the north. Marina Street provides east-west connectivity and Route R564 traverses the eastern part of the site, connecting Zandspruit to Roodepoort and Buccleuch (JDA, 2014).

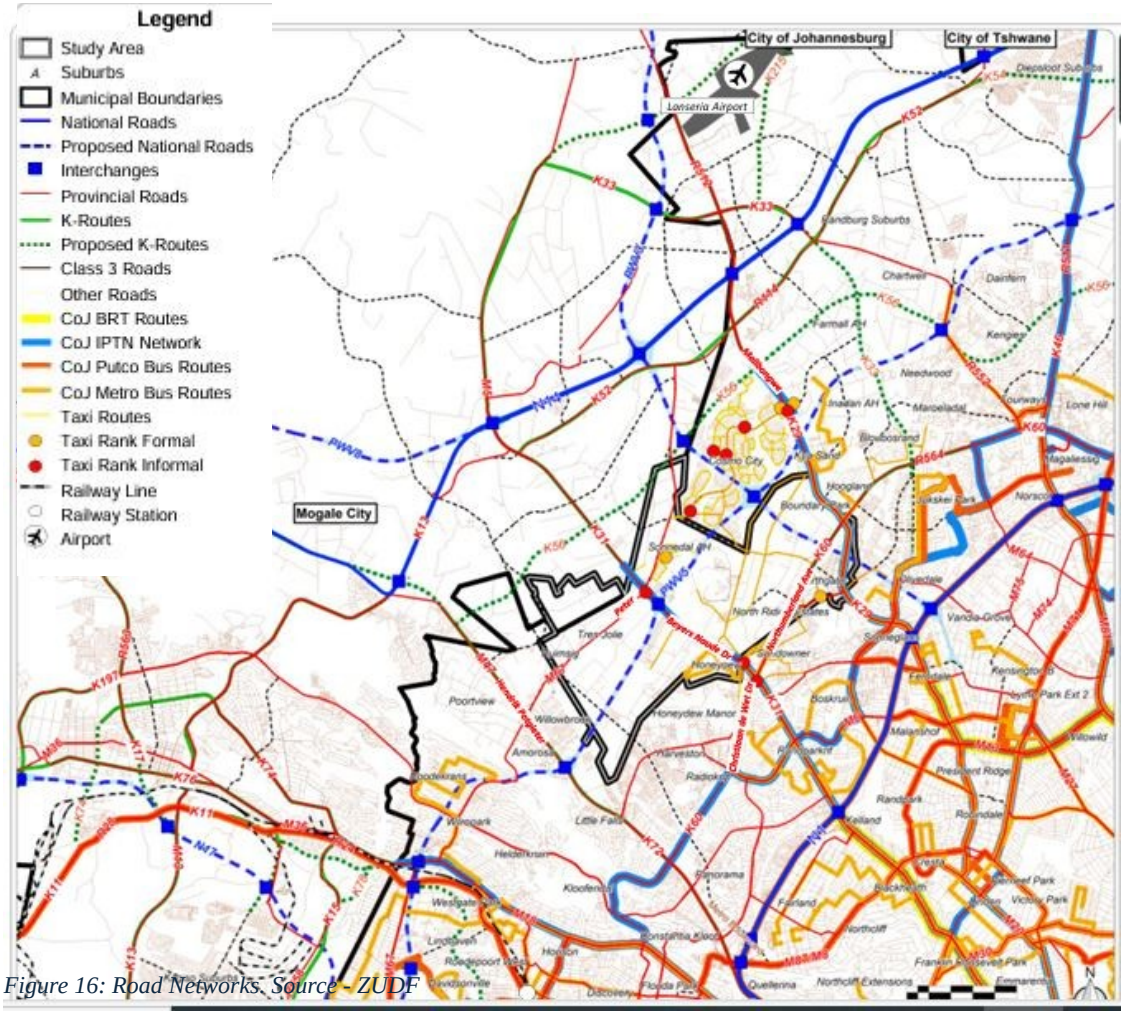


Figure 16: Road Networks. Source - ZUDF

4.3.2. Spatial Analysis: Institutional and Cadastral Structure

Zandspruit is located within ward 114 in Johannesburg Region C. The Zandspruit Urban Development Framework's study area falls within three administrative wards which include ward 97 located southwest of the study area, Ward 114 which covers the northwestern area of the site, as well as Ward 134 which is comprised of the northeastern area of the site (JDA, 2024). Zandspruit consists of a combination of formally established townships, farm portions, informal settlements and Agricultural Holdings. The Zandspruit informal settlement is situated on farm portions, with plans for formalization of the area currently underway to create a formal township. Formally established townships are located near existing formal township areas while affluent estates such as Jackal's Creek and Cosmo City are located at the centre.

4.3.3. Spatial Analysis: Environmental Features

The Zandspruit area has a few streams located within Zandspruit flowing in a north-south direction. There are also ridges, with only one ridge that is visible through desktop studies. This ridge is situated in the northern extent, from Peter Road, and is considered undevelopable by the JDA (2024). The other ridges are developable, although Environmental Studies may be required to confirm the developments that would be suitable for the area. Zandspruit does not contain any irreplaceable or Critical Biodiversity areas, although there

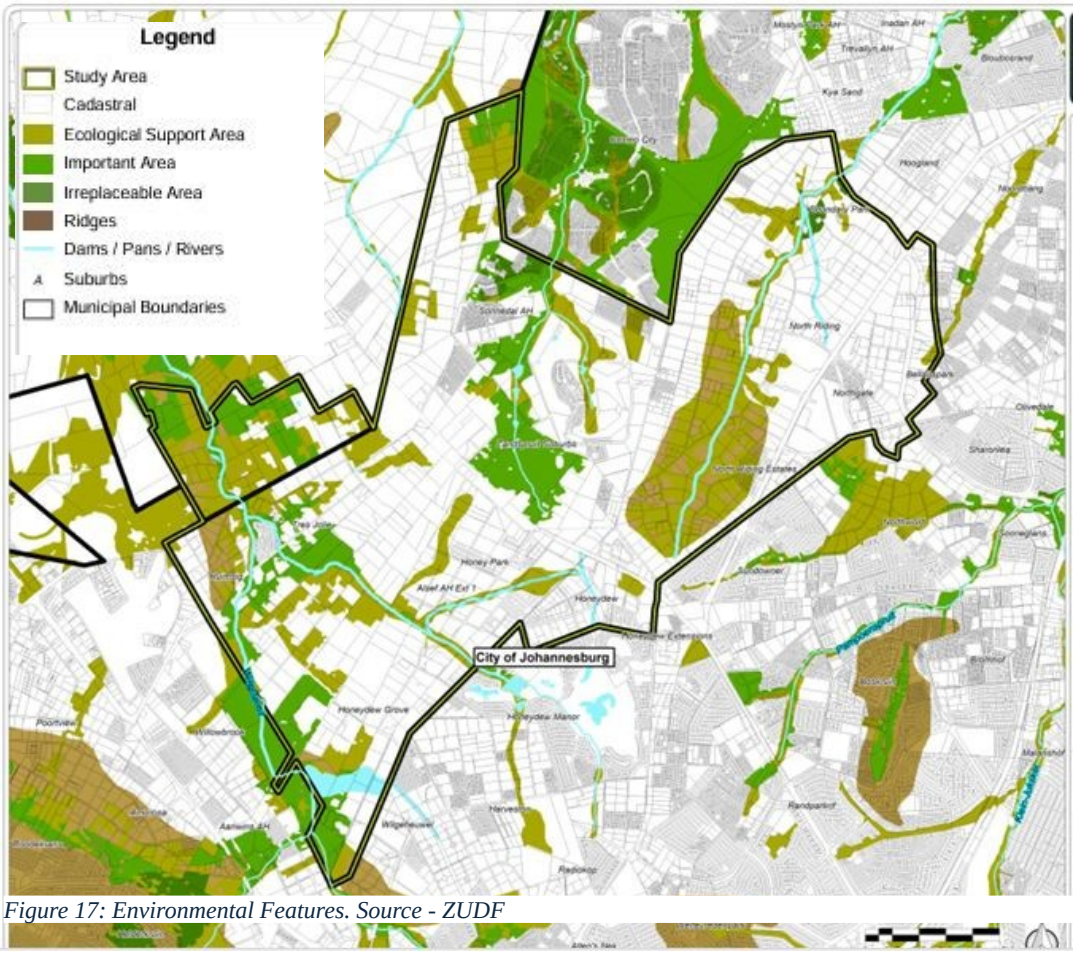


Figure 17: Environmental Features. Source - ZUDF

are important areas identified along the streams in the area which form an open space network. Therefore, caution should be taken around flood lines, which are considered non-developable areas within the Zandspruit Urban Development Framework.

4.3.4. Spatial Analysis: Economic Activities

There are a number of industrial clusters within and around Zandspruit, the largest being Laser Park and Honey Park. These form the main employment base in the area and range from light industrial or commercial factories, "glass aluminium processing, paint factories, furniture makers, chemical production plant and stone and concrete manufacturing", (JDA, 2024; 27). There are a number of retail facilities, which include five gas stations, one small-free standing centre, five local convenience stores, six neighbourhood centres, two community centres and one regional centre, as summarized in the ZUDF (JDA, 2024; 28). This means that the Zandspruit community is well-serviced with retail facilities.

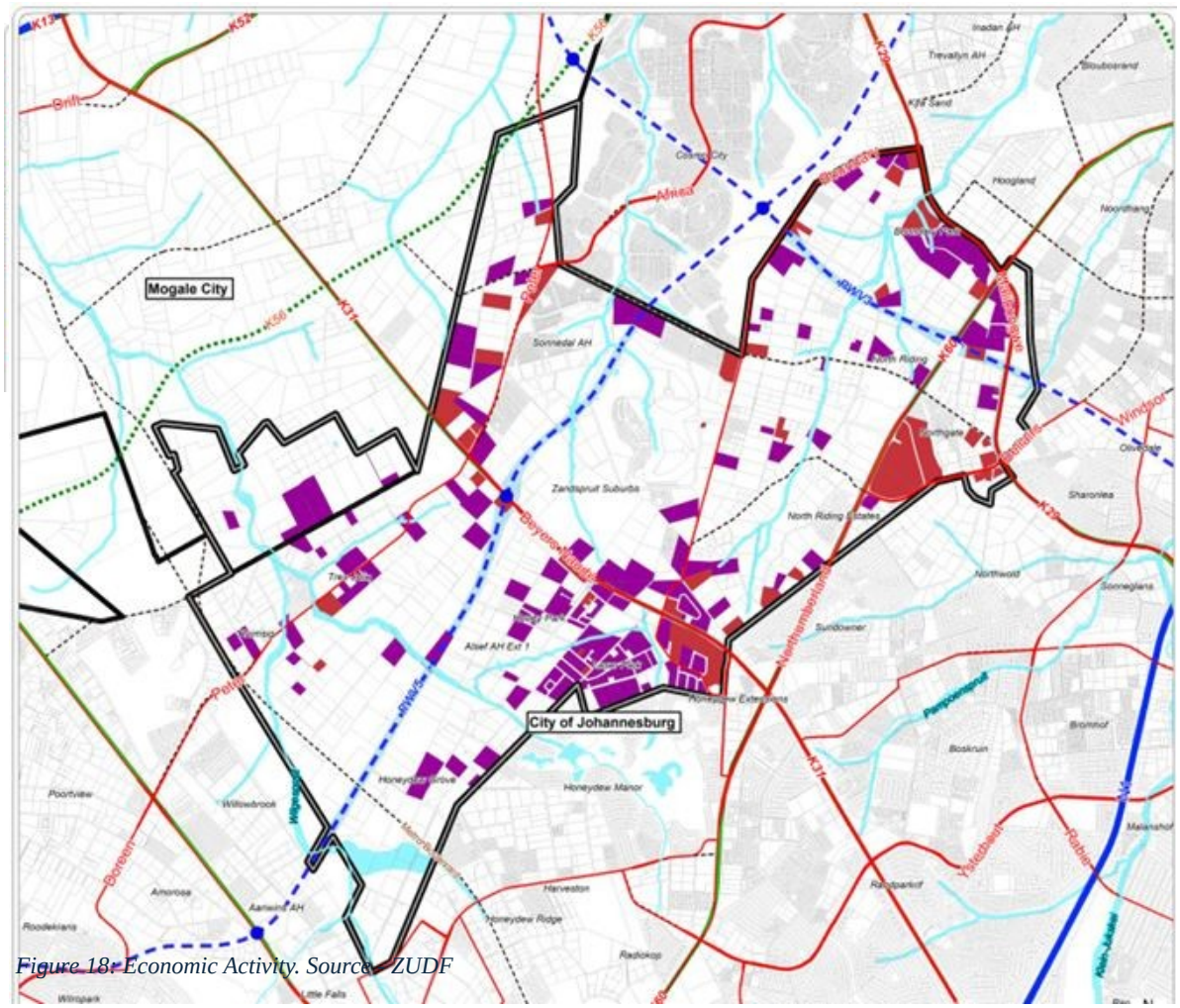


Figure 18: Economic Activity. Source: ZUDF

4.3.5. Spatial Analysis: Land Use and Community facilities

The predominant land use zone for the Zandspruit study area is Agriculture. There are also a number of land portions zoned Residential 3 or Residential 4. Monash University is situated outside the western border of the site, zoned as Institutional. Additional zones found in the area include Industrial 1. consisting of Kya Sans and Hoogland and Honeydew, located north of the study area, as well as an area zoned as Undetermined which is located towards the northwestern portion of the area consisting of agricultural holdings. There are several non-conforming land uses in Zandspruit, with economic activities focused around Bayers Naude Drive, beyond the ZUDF study area.

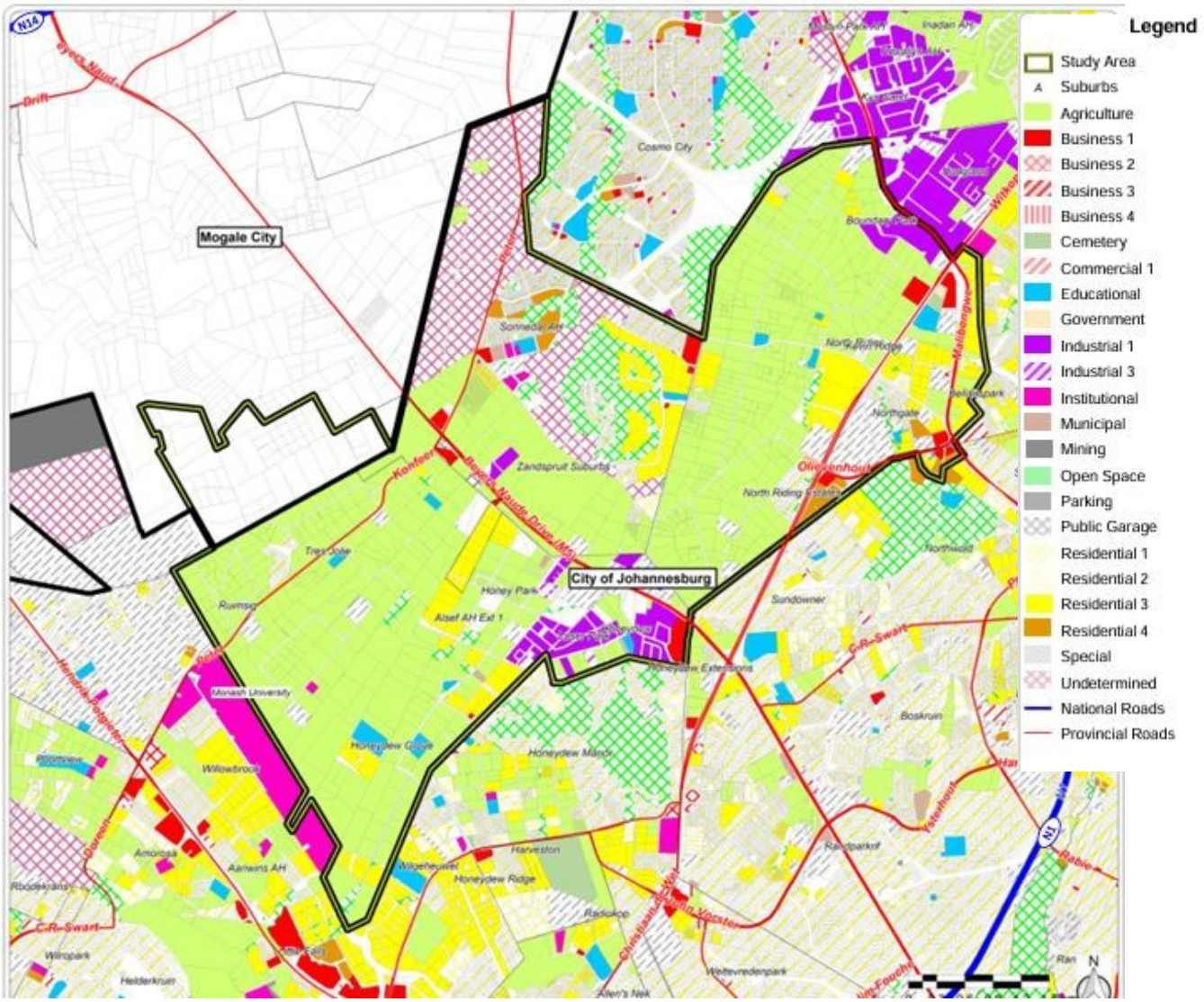


Figure 19: Zoning. Source - ZUDF

There are two primary schools, three clinics and one community hall servicing the Zandspruit area. There are limited facilities that provide services to the relatively large Zandspruit community (JDA, 2024). The remaining areas considered in the ZUDF study area consist of seven primary schools, five secondary schools and Monash University located just outside the study area (JDA, 2024). As such, the ZUDF highlights the need for an additional seven primary schools and three additional secondary schools in the study area to serve the current population of 109 451. There is also a shortage of sports and recreational facilities, with one tennis court and two informal soccer fields in Zandspruit Informal Settlement and a Golf Course. The Zandspruit area does not have a police station and only has access to one regional library.

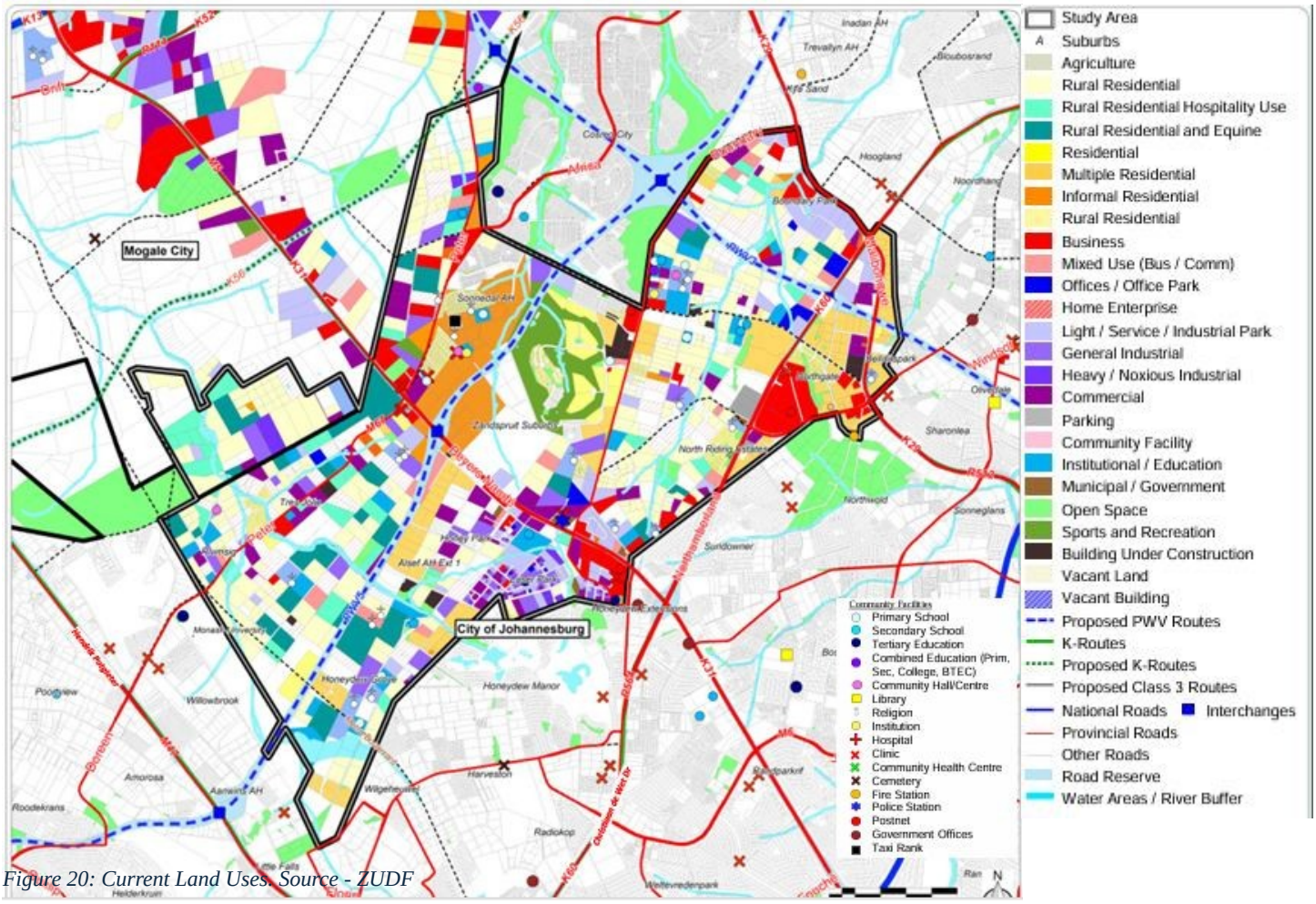


Figure 20: Current Land Uses, Source - ZUDF

4.4. Legislative Overview: Spatial Planning and Land Use Management Act no 16 of 2013 (2013).

The SPLUMA Act no 16 of 2013 "*provides a framework for spatial planning and land use management in South Africa*" (SPLUMA, 2013; 2). It exists to "*specify the relationship between spatial planning and land use management system and other kinds of planning*"

(CoJMM, 2021). SPLUMA offers "guiding principles for the development of inclusive, developmental, efficient and equitable planning at different spheres of government" (SPLUMA, 2013; 2). The general principles set out in the Act include:

"Spatial justice

This principle addresses past spatial development imbalances, which should be improved by increasing accessibility to and the use of land.

Spatial efficiency

Land "development should optimize the use of existing infrastructure and resources, and decision makers should act to minimize negative financial, social, economic and environmental impacts.

Spatial resilience

Spatial plans, policies and frameworks should be flexible to ensure sustainable livelihoods in communities most likely to experience the impacts of economic and environmental shocks.

Spatial sustainability

Spatial planning and land use management systems must ensure that special consideration must be given to the protection of prime and unique agricultural land. This principle also highlights the need for the promotion of development that is within the fiscal, institutional and administrative means of the Republic, promote land development in sustainable locations and limit urban sprawl. Urban development should promote and stimulate the effective and equitable function of land" (SPLUMA, 2013; 18).

"Good administration

All spheres of government should adopt an integrated approach to land use and land development guided by spatial planning and land use management systems. They must provide sector inputs and comply with any other prescribed requirements during the preparation of spatial development frameworks. This principle stresses the need for plans to prepare and amend spatial plans, policies, land use schemes and procedures for development applications", (SPLUMA, 2013; 18). This means policies, "legislation and procedures must be clearly set to inform and empower members of the public" (SPLUMA, 2013; 19).

4.5. Policy Analysis

The following segment provides an outline of the policy and legislative priorities of current government. This will be done in an effort to understand the manner in which local government function and work together with national government and the local government to address socio-economic development. This will be done by highlighting the manner in which policy addresses socio-economic development for areas affected by apartheid spatial planning i.e. townships located on the edge of a city or municipal boundary. This will be done by chapter 3 and 8 of the National Development Plan 2030 (2013), the 'National Spatial Development Framework (2022), the Integrated Urban Development Framework (2016), the Growing Gauteng Together 2030 (2013), the Gauteng Spatial Development Framework 2030 (2022), the City of Johannesburg Integrated Development Plan 2021-26 (2021), the City of Johannesburg Spatial Development Framework (2021)', and the Draft ZUDF (2024).

4.5.1. The National Development Plan 2030 (NDP)

Chapter three of the NDP 2030 (2013) addresses the economy and employment. Key points highlighted in this chapter include "(i) eliminating poverty and reducing poverty by increasing employment and productivity growth, (ii) to generate faster economic growth and inclusive growth by raising exports, improving skills development lowering the costs of living for the poor, investing in a competitive infrastructure, reducing the regulatory burden on small businesses, facilitating private investment and improving the performance of the labour market to reduce tension and ease access to young, unskilled work seekers, (iii) fostering effective partnerships across society and (iv) stimulating a capable state able to act to redress historical inequities and a vibrant and thriving private sector able to investment, employ people and penetrate global markets.", (NDP, 2013; 109).

4.5.2. The National Spatial Development Framework

Chapter 8 of the NDP "requires the Republic to establish a National Spatial Development Framework to guide spatial transformation" (NSDF, 2022; 38). Additionally, "section 5(3)(a) of SPLUMA provides for, and Sections 13(1) and (2) of the Act mandate the Minister to, … after consultation with other organs of state and with the public, compile and publish a national spatial development framework and review it at least once every five years" (NSDF, 2022; 38). The NSDF must direct infrastructure investment and expenditure by all national departments and SOEs. In addition, it facilitates and aligns the development of spatial plans

in all three areas of government. The NSDF “frames and guides provincial, regional and municipal spatial development frameworks” (NSDF, 2022; 38).

4.5.3. The Integrated Urban Development Framework (2016)

The IUDF (2016) is “*a guiding policy for the future growth and management of urban areas in South Africa. It responds to the post-2015 Sustainable Development Goal number 11: making cities and human settlements inclusive, safe, resilient and sustainable. It also builds on various chapters of the NDP, particularly addressing chapter 8: transforming human settlements and the national space economy. It aims to help South Africa towards creating meaningful and measurable progress in reviving rural areas and creating more functional, integrated, balanced and vibrant urban settlements by 2030. The overall objective is to guide spatial transformation through the growth model of compact, connected and coordinated cities and towns*” (IUDF, 2016; 7).

4.5.4. The Growing Gauteng Together 2030

The Growing Gauteng Together 2030 is a plan aimed at addressing global and domestic challenges faced by Gauteng province as the country's largest economic hub (Gauteng Provincial Government, 2020). The plan has a collective vision for the Gauteng City Region to be achieved by 2030, highlighting its priority actions and measures for success (Gauteng Provincial Government, 2020). The “plan of action is about executing the seven priorities with specific 162 interventions towards the Gauteng province” (Gauteng Provincial Government, 2020; 7). The GGT2030 reflects how the GCR “seeks to address the fundamental problems facing the residents of Gauteng *(i) Unemployment, (ii) Poverty and hunger, (iii) Crime and Substance abuse, (iv) Climate change, (v) Unsustainable growth and economic crises, (vi) Migration, (vii) Flight and displacement, (viii) Health, (ix) Inequality, (x) Social exclusion, (xi) Lack of decent work and social protection and (xii) Political instability, insecurity and violent conflicts”* (Gauteng Provincial Government, 2020; 7).

4.5.5. The Gauteng Spatial Development Framework (GSDF)

The GSDF was approved in 2016 and became the first Provincial Spatial Development Framework developed in terms of SPLUMA (Gauteng Provincial Government, 2022). The framework “seeks to *(i) guide, direct and focus, (ii) align, coordinate and harmonise development spending in Gauteng”* (Gauteng Provincial Government, 2022; 9). It “*aims to*

ensure rapid, sustainable and inclusive provincial economic growth and township redevelopment, therefore enabling decisive spatial transformation" (Gauteng Provincial Government, 2022; 9). While regarded as best practice since the early 2000s, "the regulation of provincial spatial development frameworks only took place after the approval of SPLUMA Act 16 of 2013, enacted in 2015" (Gauteng Provincial Government, 2022; 9).

4.5.6. The City of Johannesburg Integrated Development Plan 2021-26

Municipal councils are mandated by Chapter 5, Section 25 of the Municipal Systems Act of 2002, "to adopt a single, inclusive and strategic integrated development plan" to guide development processes within a prescribed period after the start of its elected term (CoJMM, 2021; 2). As such, the Johannesburg IDP provides guiding principles to help the council achieve its vision to become "a world class African City" (CoJMM, 2021; 4). The COVID-19 global pandemic highlighted the socio-economic challenges resulting from spatial inequality and impacting the livelihoods of marginalized communities. As such, the vision shifted from focusing mainly on compactness as a form of redress to focusing more on the principle of resilience (CoJ, 2021). 'Rebuilding a resilient Joburg' became the focus of the revised Johannesburg IDP for the 2021-2026 period. Its resilience model includes three key points which are (i) post pandemic reconstruction, (ii) forging new economic pathways and (iii) connecting and engaging communities and stakeholders (CoJ, 2021; 12). To help bring about spatial transformation in the metro, the City of Johannesburg is committed to bringing jobs closer to residents and housing opportunities to jib centres through the promotion of a logical and just spatial density in the city (CoJ, 2021). The spatial development framework sets out detailed objectives to help achieve the vision of the IDP.

4.5.7. The City of Johannesburg Spatial Development Framework 2040 (2021/22)

The Johannesburg SDF was first approved in 2016 by the Johannesburg council. It was developed in SPLUMA, which mandates all municipalities to develop an SDF and update it every five years (CoJMM, 2021). It is influenced by the IDP and provides guidelines for more detailed strategic and spatial frameworks such as UDFs and Precinct Plans (CoJ, 2021). The updated version of the Johannesburg SDF was published in 2021, presenting broad urban challenges, while keeping the responding principles the same (CoJMM, 2021). The framework outlines spatial inequality as the defining characteristic of settlement patterns in the municipality. "*The location and concentration of jobs does not match that of where*

people live" (CoJMM, 2021; 12). "*Post-apartheid housing delivery has exacerbated apartheid spatial development patterns*", due to land availability, "*by continuing to build housing in areas far from places of economic opportunities*" (CoJMM, 2021; 12). The development of malls, gated communities and office parks by the private sector has resulted in increased car dependence, further enhancing the already spatially segregated spatial pattern. Through the adoption of a compact, polycentric development model, the city aims to "*address spatial inequality, urban sprawl and fragmentation, exclusion and disconnection, the increasing pressure on the natural environment and green infrastructure, and inefficient residential densities and land use diversity*" (CoJMM, 2021;13).

4.5.8. The Draft Zandspruit Urban Development Framework (ZUDF)

The vision of the ZUDF is to develop "A vibrant precinct where residents prosper sustainably in a dynamic, resource efficient environment, with a range of job opportunities, diverse housing typologies, and community facilities, which is seamlessly integrated with the broader region, encouraging social, economic, and physical networks.", (Plan Associates Development Planners, 2024; 43). The main development objectives of the ZUDF respond to the natural environment, mobility networks, economic activity, community facilities, residential development and infrastructure investment (Plan Associates Development Planners, 2024). The framework proposes the "amendment of the urban development boundary, to include the area west of Peter Road and the Sonnedel Agricultural Holdings, as well as the Honeydew Grove area at the strip of land along the western boundary" (Plan Associates Development Planners, 2024; 45).

4.6. Conclusion

Zandspruit is located within the area earmarked as an Inner-City Zoze within the GLMP. It falls under CoJMM's second largest region, which currently attracts a young population due to various economic clusters located within the Region. Due to this, employment statistics in the area reveal that 81, 3% of the economically active residents are employed. Although employment prospects for residents in the area are relatively good in comparison to the rest of Gauteng City Region, the main issue in the study area is the lack of social amenities that cater to the increasing population. There are two primary schools, three clinics and one community hall servicing the Zandspruit area. There are limited facilities that provide services to the relatively large Zandspruit community (JDA, 2024). Additionally there is a housing delivery challenges, a growing informal settlement and 62, 3% of the population

renting residential properties. As such, the ZUDF intends to address the housing challenges with in-situ upgrading for the northern portion of the Zandspruit informal settlement, and the extension of the Urban Development Boundary to allow for formalisation and extension of the Zandspruit Informal Settlement. The ZUDF was formulated by the CoJMM, in line with the Johannesburg SDF and Nodal Review. As such, the ZUDF currently supersedes the GLMP as it was approved through normal channels while the GLMP was received and endorsed as a directive from the CoJ Council. However, the ZUDF recognises the development proposals found within the ZUDF.

The situational analysis of Zandspruit hihlights the socio-economic and spatial challenges that persist due to past apartheid spatial planning, compounded by the rapid urbanization of Johannesburg. The data reveals a fragmented spatial structure, a high proportion of informal dwellings (41,9%), and limited access to essential services such as schools, clinics, and recreational facilities. Despite being located in a region with a significant economic activity, Zandspruit Township residence face barriers to accessing these opportunities due to inadequate infrastructure and spatial disconnection. The Zandspruit Urban Development Framework (ZUDF) aligns with the Greater Lanseria Masterplan (GLMP) by proposing in-situ upgrading of informal settlements and extending the urban development boundary to formalize housing. However, the success of these initiatives depends on addressing the underlying socio-economic disparities and ensuring that the proposed developments are inclusive and accessible to low-income households. The GLMP's vision of a smart city must integrate these local realities to avoid perpetuating spatial inequalities and exclusion.

Chapter 5: Research Findings

5.1. Introduction

There are several perspectives regarding the potential effects of the development of the Lanseria Smart City. Nevertheless, there appears to be a lot of enthusiasm regarding the GLMP as a cohesive plan that requires good leadership to achieve its good implementation. On the other hand, there is criticism that challenges the over enthusiasm around the GLMP.

This chapter reports on these perspectives shared during in-depth interviews and during smart city conferences, webinars and online meetings. The perspectives are broken down into four key themes that came from the participant observation research. These are: (a) the idea of a good "smart" city, (b) perspectives of Lanseria as a mega project, (c) evaluation of the Lanseria Smart City, and (d) perspectives of Lanseria as a new Smart City. As such, the first portion of this chapter focuses on developing these four main themes that came from the participant observation study as well as from literature on the smart city approach. The themes are also developed according to recurring questions or statements made by presenters at the first Africa-US Smart Cities Lab Conference held on 14 August 2024, the Smart City Africa-US Smart Cities Lab Webinar held on the 17th of October 2024, as well as the Bi-Weekly Progress Meetings held on the 18th of October 2024, and semi-structured interviews. The second and final portion of this chapter will provide a brief discussion that aims to compare these four themes to the main claims from the conceptual framework and a conclusion.

5.2. Theme 1: ‘the idea of a "*good*" smart city’

Discussions with the participants in this study suggest that the concept of smart cities is often employed as part of a longstanding discourse about the good city, and it can be seen as a new tool for rebranding some urban typologies but also as a new angle of approach from which to arrive at urban ideals. One of the key speakers at the Africa-US Smart Cities Lab conference was a representative of Waterfall City Management Company. He highlighted the challenges and successes of developing Waterfall City, an award-winning mixed-use development, that has become a perfect example of how to create self-sustaining communities through the live, work and play principles with reduced reliability on transport for mobility. The main challenge regarding the development, he outlined, was that developing the basic building blocks such as infrastructure is a lengthy and expensive process. Another speaker, a Steyn City representative, provided a presentation on Steyn City, a gated residential area that was designed "as a legacy project that would benefit not only its residents but surrounding communities as well", he said in his presentation. "It took 15 years to complete the lifestyle estate, as the developers wished to create a blueprint for the cities of tomorrow", he added. Situated right next to Diepsloot Township, the estate consists of 760 apartments. The development ensured that nearby communities and residents benefitted from the project. Steyn City created over 25 000 jobs for nearby residents along with full-time employment in cleaning, landscaping and security services. In addition, the Steyn City foundation was an

initiative developed as the estate's vehicle for supporting the neighbouring Diepsloot township.

However, remarks from the Q&A session at the conference questioned the exclusionary nature of both Steyn City and Waterfall City. A researcher questioned why such organised developments had to be so "up-market" and the possibility of developing decent low-cost, high-quality housing to include townships and address the issue of inequality. "Steyn City never sought to address housing challenges and inequality in South Africa", admitted the presenter and representative of Steyn City. He pointed to the flagship programs they developed to help the neighbouring Diepsloot Township, and the number of jobs created through the development. This was similar to the response given by the representative of Waterfall City when questioned about the intentional exclusion of townships in their masterplan. As such, both developers of Steyn City and Waterfall City acknowledged the exclusionary nature of the estates resulting from private management and control, and both mentioned their eagerness to witness the construction of the Lanseria Smart City as a government-led mega project that provides these services and promotes inclusivity to the general public.

The Lanseria Smart City megaproject is thus viewed by its project administrators as a development that "*will be inclusive of the broader South African socio-economic spectrum*" (GAPP et.al; 2021; 12). "*It is to be a truly post-apartheid city that is a publicly led initiative that welcomes and enables the involvement of a broad range of stakeholders including local communities, community interest groups, the business community and developers*", as described in the GLMP (2021: 12). It must stimulate a vibrant, mixed urban economy. Another member of a research institute at the conference, asked about digital nomads and the possibility of developing an SEZ using Public-Private Partnerships. The representative of Waterfall City mentioned that the incorporation of an SEZ in their smart city is possible and could attract business in their precinct and in the Lanseria Smart City. However, he mentioned, this would require good leadership and supportive legislation. Additional comments discussed the idea of a good "smart" city as one that is well integrated, with affordable, formalized housing. This ideal city, a representative from a research institute added, should be one where communication between citizens and the state should happen not only through institutionalized channels. Additionally, he said, there must be a commercial hub to stimulate regional economic development, proper housing with no informal settlements and access to amenities.

There have been several mega projects focusing on constructing new cities in South Africa. Waterfall City, for example, is a master-planned megadevelopment that broke ground in 2006. The mixed-use mega project was built entirely from scratch, located in between the City of Johannesburg and Pretoria and stretched on 2200 ha of vacant land (Murray; 2014). The mega-project combines 'hyper modernist' principles of "*smart growth, cutting edge ICT and state-of-the art infrastructure with a focus on mixed-use facilities, a human-scale built environment and pedestrian-friendly precincts*" (Murray; 2014: 503). Steyn City is another master-planned development labelled as 'one of the largest and most exciting lifestyle developments to launch in Johannesburg's Northern suburbs', (Business Day; 2014: 10). These mega projects emerged because of safety concerns in the northern suburbs of Johannesburg, leading to the rise of security estate developments that were initiated as early as the late 1980s (Business Day; 2014). The developments made use of smart growth and smart technology to build lifestyle estates that provide comfort, convenience and safety to their residents (Steyn City; 2022).

A researcher from Public Affairs Research Institute (PARI) highlighted the complexity in understanding the key stakeholders involved in the Lanseria project. She stressed the need to look at the project as a mega development and questions "*the idea of it being regarded as a smart city development, specifically the impact of digital technologies on metropolitan expansion, engineering and municipal management. There should be studies on the texture of social life and institution fabrication of urbanity as embedded inequality, to help unpack the role of the elites in cities as growing machines*", she stated. This, in addition to urbanisation in the global south and current settlement, planning and urban citizenship, should inform future developments to ensure their responsiveness to current socio-economic challenges. To study the Lanseria project, concepts such as 'the right to the smart city' should be considered to assess and bring to light individuals or groups that may be "left behind". There is also a need to understand the local contexts and different social and political understandings within each context. These ideals inform the key development objectives of the Lanseria Smart City. However, these ideas of the ideal city have always existed within the broader theory of urban utopianism. Scholars such as Kruger (2014: 120) highlight the arguments presented by Lewis Mumford and David Harvey, "that the first (western) utopia was a city, and that the first city was a utopia". There has always been an intertwined relationship between 'the city' and the 'utopia' which has regrettably resulted in their mutation into the original dystopia that caused the emergence of social ills and suffering as the byproduct of this phenomenon (Kruger,

2014: 119). The City as a utopia was established as a 'construct to impose and regulate "cosmic order"' in social and spatial terms (Kruger; 2014: 120). Therefore, the GLMP's proposal of a smart city could result in the emergence of socio-economic inequality, resulting in a lack of understanding of the local context and the different social, economic and political aspects at play.

5.2. Theme 2: perspective of Lanseria as a mega-project

During her presentation at the first bi-weekly meeting, the researcher from PARI mentioned how smart city projects are viewed by some scholars as developments that do not necessarily promote alternative and substantive strategies of urban development. They instead propose “traditional, chaotic urban models which have existed for millennia”. "As such", she added, "these big plans for new developments can be seen as fantasies, as new colonial cities in a sense that creating new spaces or institutions could be seen as a solution but also as nationalistic projects". Both representatives of Steyn City and Waterfall City, as well as representatives of the Lanseria project expressed that developing a new smart city is a prolonged and expensive process. This is because the Lanseria Smart City project is a large-scale endeavour which requires huge investment commitment, vast complexity with long-lasting impact on the economy, the environment and general society (IOT, 2021). Thus, the project has characteristics that fit perfectly with the definition of mega developments or mega projects. The representatives of Waterfall City and Steyn City both mentioned how planning a smart city should begin with the identification of the problems that people encounter at that time. The master plan then acts as a response to the problems. Thus, their perspective is that a smart city should address a societal challenge.

Research scholars at the conference and the Africa-US Smart Cities Webinar, also argue that successfully constructing a new city should be primarily a public affairs process rather than a development process. Therefore, while Waterfall City and Steyn city were conceptualized as a response to a problem or a series of problems, they are mega projects, conceptualised through a development-led process which required huge investments, from investors whose intentions are to see returns. This has resulted in the creation of smart precincts that prioritize safety and high-end service utilities over issues such as inclusionary low-cost housing. Therefore, representatives of Steyn City and Waterfall City, ands researchers, members of the public sector at the conference concluded that incoming administrations should make the creation of new cities a high policy priority, incentivized through the provision of

infrastructure. As such, these are the different views they share regarding the Lanseria Smart City as a mega project, an extremely large-scale construction and investment project.

5.2.1. Opportunity

The construction of the Lanseria Smart City, as stated by the researcher from PARI in her presentation with GAPP, is viewed by some as an opportunity for developers and investors entering Sub-Saharan Africa. She mentioned how the GLMP is viewed as an ‘opportunity’ for South Africa to build a new post-apartheid city. One interview respondent remarked on the ANC-led government's inability to build a new city that addresses challenges brought by increased urbanization and the apartheid spatial planning legacy. She, therefore, sees the smart city as ‘an opportunity to stimulate the development of a multi-teared high growth node that will absorb the growing population within the Gauteng City Region’. "The success of the smart city", she added, "will stimulate employment opportunities and ultimately lead to the development of a new Special Economic Zone (SEZ)". When asked about the development's impact on the township economy, she added that Township Economic Revitalization Strategies will be addressed through economic master planning processes. The project also presents an opportunity for inclusionary housing opportunities for both residents and people who might want to buy houses in the area, another official from the CoJMM added. The representatives of Waterfall City and Steyn City believe that the project also presents an opportunity to maintain a high profile, providing state-of-the-art facilities for residents. However, they believe that this could only be possible if the project is coherent. There are also concerns expressed by interviewed individuals by the PARI researcher around the capability of the project to deliver on its promises.

5.2.2. Concerns and mistrust from surrounding communities, including Zandspruit residents.

While there has been a public participation process undertaken during the development of the GLMP, findings from PARI reveal that there does not seem to be a huge amount of knowledge regarding the project. This caused a bit of anxiety among interviewees, more specifically on how the project might impact them. The results revealed a large group of interviewees' scepticism on the fulfilment of the project, sometimes due to a lack of knowledge/assessing the feasibility of the project. One of the members from the GAPP team noted how such questions are expected, adding that while public participation processes were carried out in 2021, during the COVID-19 pandemic, they were carried out on online platforms, and such an engagement will never equate to one-on-one engagement. Public

participation is a costly process that requires the development of a communication strategy to ensure its effectiveness in addressing public concerns. He also mentioned how some of these concerns were addressed, noting little engagement from the public. He then suggested the need for the Human Settlements Department to have an engagement session to address some of these concerns. This, he added, is because "more dedicated efforts towards public participation processes should be carried out at a more local level by more localised projects such as the Zandspruit Housing Development project proposed by the ZUDF".

5.2.3. Challenge and threat to livelihood

The in-depth interviews by PARI also revealed how the interviewees view the Lanseria Smart City project's potential to pose a challenge and/or threat particularly on vulnerable informal settlement residents or individuals living precarious lives. As the project implementation progresses, there are questions around evictions, job loss and more generally on what will happen and when the project will commence. Small developments such as the installation of a fence have caused residents, mostly in informal settlements, to question the effects of the project on their daily lives. The recent publication of the context-specific Zandspruit Urban Development Framework's proposal of in-situ informal settlement upgrading and the removal of residents in some parts of the Zandspruit Informal Settlement to a different location, could potentially fuel the concerns expressed regarding questions on displacement and job security. Representatives of the master plan have already conducted public participation processes to help address some of the public concerns regarding the Lanseria project, highlighting the little engagement from affected communities and the need for the Human Settlements Department to have an engagement session to help address the community's concerns.

5.2.4. Perspective from CoJMM Development Planning Department

The GLMP was endorsed directly by the Gauteng Office of the Premier which was under the ANC-led government in 2021. This meant that the rest of the CoJMM had to ensure that the objectives and guidelines of the master plan are incorporated into future local plans, frameworks and policies. As such, an interview with the CoJMM's Spatial Transformation and Strategic Planning department representative, revealed that the biggest challenge for the City of Johannesburg's Spatial Transformation and Strategic Planning department is that they were not adequately included during the formulation of the GLMP. The GLMP was not approved through normal channels in a way that other plans would be approved by the CoJMM. The plan was received as a directive straight from the Gauteng Office of the

Premier, and the CoJMM Council and Management department, a high level, politically endorsed project that had to be elevated into the CoJMM local plans.

As such, the department of Spatial Transformation and Strategic Planning has experienced challenges in aligning the GLMP objectives with its current spatial vision and framework. However, the department understands that the project is in progress and is determined to align it with the City's development strategies. However, the objectives of the GLMP are a good reflection of sound town planning and align with the guiding principles of the SPLUMA Act 16 of 2013. They also align with the CoJMM's spatial vision of a compact, polycentric city with mixed use development and sustainability underpinned by transit-oriented development. As such, both the GLMP and the Johannesburg SDF agree on guiding principles but disagree on the location of the proposed Lanseria Smart City.

The area affecting the CoJMM was envisioned for low to medium density development, as outlined in the City's Nodal Review. The GLMP, however, proposes the intensification of land use activity around the Lanseria Airport to develop an industrial and economic node. The broad vision of the CoJMM's SDF did not propose the intensification of land uses; however, the city understands that there is a political initiative or "directive" to ensure that the Lanseria Smart City becomes a reality. As such the city is working to ensure that their plans and policies align with the development objectives of the GLMP. However, it should be noted that the Lanseria Smart City will not affect the current administrative regions or boundaries as the boundaries of the three municipal regions it falls within will not be changed. The intention of the GLMP is not to create a new ward or administrative boundary but to allow the Lanseria City to function as its own centre.

5.3. Theme 3: evaluation of the Lanseria project

To assess the impact of the GLMP's proposed 'smart city' and its influence on the Zandspruit community, there is a need to look at the Lanseria Smart City project as a mega development and 'to question the idea of it being regarded as a smart city development'. The discussions at the first bi-weekly progress meeting held by the project representatives also" focused on the need to assess the impact of digital technologies on metropolitan expansion, engineering and municipal management. There should be studies on the texture of social life and institution fabrication of urbanity as embedded inequality, to help unpack the role of the elites in cities as growing machines", a researcher from PARI stated at the first bi-weekly progress meeting.

"The evaluation of the Lanseria mega projects needs to go beyond discourses of success and failure in evaluating such projects", she added.

There is a complexity in understanding the different stakeholders, plans and frameworks that will guide the implementation of the objectives of the GLMP. The researcher believes that, to assess the overall impact of the project, there should be an analysis on the texture of urban life, institutional capacity to deliver, the urban fabric and embedded inequalities. The idea of the digital city, and the development of industrial and economic nodes as well as the role of the elites should be questioned to assess the overall relevance of the Lanseria Smart City. Moreover, the complexities brought by settlement upgrading proposed for the Zandspruit township might result in dispossession, as is often the case with housing and basic service delivery within the post-apartheid South African context. Therefore, this presents the need for the development of public participatory mechanisms that work for both the Zandspruit community and municipal authorities.

There is a need to investigate different collaborative tools to help the Zandspruit community and the CoJMM shape a common goal, which could enable current thinking around the broader GLMP to go beyond the public vs private sector debate. This could help address the need to assess '*the concept of the right to the smart city'* and the importance of politicizing the research through feedback. Therefore, to study the project, concepts such as 'the right to the smart city' should be considered to assess and bring to light individuals or groups that may be "left behind". There is also a need to understand the local contexts and different social and political understandings within each context. "*The role of the state on issues regarding policy, implementation and governance should be at the core of research, especially political influences, as they play a critical part in determining the successful implementation of the Lanseria Smart City project* ", she added.

5.4. Theme 4: perspectives of Lanseria as a new smart city

There are two main perspectives emerging from academic or research perspectives regarding the Lanseria Smart City project. On the one hand, there have been critiques over the over-enthusiasm around smart cities and the potential for the recreation of traditional modernist planning models. Smart cities are criticized for proposing traditional "chaotic" urban models, far from their intention to promote alternative and sustainable strategies of urban development. This is because promoting new projects over proposing strategies to resolve existing challenges can reinforce traditional urban models. Organised areas, particularly with

the case of gated communities in South Africa tend to be upmarket and exclusionary. Given that it takes time to develop basic building blocks to add more or complete a masterplan, there is therefore a need to consider the long-term trajectory of urban expansion and administrative transformation in Johannesburg. On the other hand, there have been researchers who are very enthusiastic and optimistic about the GLMP. They believe that having a proper, cohesive master plan will result in its good implementation.

As such, more emphasis is placed on the idea that the success of any smart city depends primarily on good government, political will, and good leadership. The blame on the decline in service delivery over the past few years has been placed on incompetence, based on the notion that municipalities are made up of incompetent people who cannot use state resources adequately. This argument was made by an interviewee, during a follow-up interview after the Africa-US Smart Cities Conference. This highlights the lack of trust and miscommunication between municipalities and developers, and political tensions which continue to put blame regarding South Africa's economic performance on the ANC-led government. When addressing the issue of funding the Lanseria Smart City, the interviewee highlighted that through proper budget allocation and risk assessments, it is possible to achieve the GLMP's vision with funding received from the government.

5.5. Discussion

Throughout the creation of the Lanseria Smart City, there is a wide acknowledgement of the idea of a good "smart" city as one that is well integrated, with affordable, formalized housing. The GLMP's economic strategy proposes, through the principle of concentration, compact and complex developments and encourages socio-economic integration through mixed use development. This also involves residential integration to allow the city to naturally grow its economic base through cultural integration. These objectives are similar to the CoJMM's vision of developing a compact, polycentric city through mixed use development and transit-oriented development. Both the economic sector based and geographically based smart city strategies tend to borrow from already existing local economic development strategies. LED strategies now form part of the Integrated Development Planning (IDP) process in South Africa.

The smart city development approach chosen by a specific administrative region, municipality or country plays a crucial role in determining the resulting city typology. The GLMP proposes “*the adoption of the holistic smart city approach for the development of the*

Lanseria Smart City" (GAPP *et.al.*, 2021; 12). The creation of a new smart city encompasses the incorporation of hard and soft infrastructure smart city strategy, the economic sector based and geographically base smart city strategy. It would require the establishment of good governance and urban management principles, taking into consideration the existing culture and metabolism within residential areas within the study area as well as neighbouring neighbourhoods and cities. This would set the foundation for economic sector development strategies and geographical location of clusters within the city.

However, due to the fluidity of the smart city concept, smart cities can be used to describe (a) a type of branding; (b) a portfolio of technologies that have applications in urban management; (c) or a diverse range of demands for cities and urban management to improve efficiency, quality of life, public participation etc. The current emphasis on good leadership and good governance as crucial to the success of the Lanseria Smart City currently pushes the development to lean more towards the institutionally based smart city typology, as opposed to the envisioned holistic approach. This typology puts more emphasis on "leadership, vision, organizational transition and legal and regulatory barriers as important features of a smart city" (Desdemoustier et.al, 2019; 131). Government support and policy lies at the centre of the designing and implementation of the smart city concept (Desdemoustier et.al, 2019). "The main aim is to produce a holistic smart city that suggests that the combination of these approaches can enable the development of a smart economy, smart transport, smart environment, smart living and smart governance" (Desdemoustier et.al, 2019; 131). However, institutional capacity is given more emphasis as key towards successfully implementing the GLMP.

5.6. Conclusion

The findings reveal a mixture of optimism and skepticism regarding the GLMP and its proposed Lanseria Smart City. While the project is seen as an opportunity to create a post-apartheid city that is inclusive and sustainable, concerns about it's feasibility, inclusivity and potential socio-economic impacts persist. Key themes include:

- The idea of a "Good" Smart City: The GLMP aspires to create a city that is integrated, inclusive and economically vibrant. However, comparisons to exclusionary developments like Waterfall City and Steyn City raise questions about whether the Lanseria Smart City can avoid similar pitfalls.

- Lanseria as a Mega-Project: The scale amd ambition of the project presents both opportunities and challenges. While it has the potential to stimulate economic growth and create jobs, the lack of trust among local communities and concerns about displacement highlight the need for more robust public participation and transparent communication.
- Evaluation of the Lanseria Project: The GLMP's reliance on the principle of concentration to foster economic growth and integration is promising but requires careful implementation to avoid reinforcing existing inequalities. The project must prioritize affordable housing, access to services, and the inclusion of marginalized communities like Zandspruit.
- Perspectives on Lanseria as a New Smart City: The success of the project hinges on good governance, political will, and effective leadership. However, the lack of alignment between the GLMP and local municipal frameworks, as well as the limited engagement with affected communities, poses significant risks to it's implementaion.

The findings underscore the importance of aligning the GLMP's objectives with local realities and ensuring that the project addresses the socio-economic challenges faced by communities like Zandspruit.

Chapter 6: Discussion of Findings and Conclusion

6.1. Introduction

This research looked focused on the evaluation of the GLMP, a framework currently proposing the development of a new smart city in an area falling within three municipalities, the CoJMM, the CoTMM, and MCLM (GAPP *et.al*., 2021). It aimed to evaluate the degree in which the 'smart city approach to urban development' in South Africa could impact the socio-economic fabric of the area in which they are applied. Specifically, this study intended to examine this potential on the Zandspruit Township area. The significance of this research is its potential to contribute towards the 'smart city' literature and potential outcomes of smart city developments within the South African context. Therefore, this chapter provides a synthesis and discussion of the major findings of the research and provides recommendations as well as areas for future research in relation to this research.

6.2. Synthesis: The smart city concept vs Planning Theory

The urban planning process is influenced by three categorical theories, "*(i) theory for use **in** planning, (ii) normative theory **of** planning, and (iii) critical theory **about** planning*" (Alexander, 2003; 179). While one set of planning is devoted to the process of planning, the other "*treats the context of planning and the object of planning with little reference to theories of the planning process*" (Fainstein, 2005; 1). This division in planning practice has led to a similar divide in scholarship. Despite their implicit claims for normative planning theory's universal relevance, advocates for normative theory about planning, which provide a general theory of planning, often ignore it in practice (Fitting, 2002). This is an indication of the diversity of practices of planning, with planners in different contexts enacting different models or theories to try and resolve challenges within their contexts (Fitting, 2002). Normative planning theorists "delve into an abstract process isolated from social conditions and planning practice" (Fainstein, 2004; 121). As a result, planning approaches are rarely applied in real contexts and are often given "lip service" by their advocates.

Current cities are at a unique stage where the urban population is expected to increase to 70% by 2050. Cities have become complex systems consisting of many interdependent components with "*distinct properties arising from these interdependencies*", (Westraadt and Calitz, 2018; 2). Cities have become junction points between "global flows of people, goods, information and finances" (Greco and Cresta, 2015; 7). Due to this, there is a need for cities to become self-sufficient. Urban planners and practitioners are calling for a coordinated

approach and appropriate frameworks, and integrated decision-making to eliminate systematic inefficiencies as a result of rapid urbanization (Westraadt and Calitz, 2018). Current thinking suggests that the ‘smart city concept’ is the route that should be taken to ensure that cities are sustainable, self-sufficient and competitive in the global economy (Greco and Cresta, 2015).

Cities in developing countries were developed through the borrowing of western knowledge as blueprints for city development (Dodero, 2010). This knowledge was exported to several countries following the end of the Second World War. This was done to improve socio-economic conditions left by colonialism and poor socio-economic conditions prevalent in previously colonialized countries (Dodero, 2010). South Africa, however, presents a unique case, as the implementation of the top-down planning approach was used to develop the racially segregated apartheid city. The Apartheid spatial planning has left a legacy of dysfunctionality and segregated cities with one of the worst social inequalities in the world (Turok, 2006). This, in addition to collapsed services and "enfeebled public institutions", has worsened social conditions in the poorest regions (Turok, 2006; 2).

While cities have always been impacted by technology, the smart city concept has grown to become a widely accepted concept, often institutionally led as part of city development and investment strategies (Willies and Aurigi, 2020). Given the challenges brought by previous planning approaches, understanding socio-economic implications of the smart city concept is an important field that needs to be explored (Willies and Aurigi, 2020). A successful smart city relies on a capable government that can effectively "adopt smart principles to respond to challenges" (Wilson and Guya, 2019; 3). As a key characteristic of smart cities, smart governance may offer a way to help governments deliver services or engage with civil society in urban development (Wilson and Guya, 2019). South African cities continue to face governance challenges, with service delivery worsening, and urban poverty and inequality increasing. Therefore, the relevance of smart cities in South Africa depends on the effectiveness of local government (Wilson and Guya, 2019).

6.3. Synthesis: The smart city concept vs Utopian Thinking

Utopian thinking stems from reactions and criticisms of the industrial cities in Europe and America (Fitting, 2002). The industrial revolution was characterized by a shift from the labour-intensive economy to a more "capital intensive economy based on manufacturing by machines, specialized labour and industrial factories", as described by Wyly (2012: 3).

Concurrently, more people moved from rural areas to towns and cities to work in factories, leading to increased urbanization (Wyly, 2012). The resulting rapid population growth and factors such as poor working conditions, the housing crisis that led to the increased development of slums, high crime and pollution led to the enlightened ideas of social justice (Fishman, 2012). South African cities have transformed into large urban agglomerations that influence rural-urban migration and increased in-migration by individuals from different parts of Africa. This has resulted in similar challenges caused by rapid population growth such as access to housing, service delivery, high crime, increased informal settlements and unemployment. Such challenges are predominant in South African cities following 'its re-entry into the global economy and its pursuit for its neo-liberal policies that have damaged jobs and income', (Turok, 2006: 2). The roll-out of political, civil and social rights to the previously disadvantaged majority has raised expectations of socio-economic progress. However, this has also highlighted the cultural, religious and class divisions prevalent in South Africa (Turok, 2006).

Utopian thinking, which is based on "the dream of a better world", influenced development planning models of the 20th century (Fitting, 2002: 3). The first urban utopia, the 'Garden City Model' was imagined by Ebenezer Howard in his "Tomorrow: A Peaceful Path to Real Reform" (Miller, 2002: 1). This was followed by Le Corbusier's "*technological, planned city*" in his early projects in the 1920s and 1930s (Fitting, 2002; 3). Universities and professional bodies emerged during this period, to help define and protect building standards within urbanized nations of the west (Hall, 2014). Development initiatives stemming from professional needs in related professions such as architecture and engineering led to the legitimization of urban planning as a separate field (Hall, 2014). At the time, planning was concerned with developing and enforcing plans and building codes, making use of relevant planning knowledge with necessary design skills borrowed from planning education (Hall, 2014). During this period, planning increasingly relied on a rational model as the dominant tradition, often relying on scientific conceptual or mathematical models (Hudson, Galloway, and Kaufman, 1979). By the mid-50s, planning was concerned with land-use planning which would later be criticized for its 'alienating effects' arising from high-rise planned cities (Fitting, 2002; 7). These 20th century planning approaches created more problems, leading to the development of new planning theories and practices overtime (Hudson, Galloway, and Kaufman, 1979).

Professionals have always been there to try and resolve these problems through urban design, public works programs, foreign policies, future forecasting, transportation, and in developing laws that govern urban development ((Hudson, Galloway, and Kaufman, 1979; 387-388). The "top-down" nature of planning was criticized for being 'unrealistic' since policy decisions are better derived through decentralized processes within a democratic economy (Hudson, Galloway, and Kaufman, 1979). The ideals of purity in some of the modernist movement's principles led to the construction of "highly impractical buildings", often at high costs (Fitting, 2002). Land Use planning through zoning codes produced buildings and living spaces with alienating effects and led to what Jane Jacobs describes as the 'loss of street life' (Fitting, 2002; 7). Scholars such as Allam and Newman (2018) argue that the smart city concept reflects the new modernist town planning approach. This, they argue, is due to their lack of consideration of cultural and historical profiles of the contexts in which they are being applied (Allam and Newman, 2018).

The two main perspectives on smart cities reveal the different positions taken regarding their adoption and potential outcomes. One stemming from the traditional planning model, based on the belief that having a proper, cohesive master plan will result in its good implementation. The other perspective proposes the development of strategies to resolve existing challenges can actually reinforce traditional urban models. Literature on smart cities reveals that there is a wide variety of smart city typologies. These range from the technological smart city to a holistic smart city that encompasses a mixture of technology, human capital and creativity, with institutional factors such as sustainability. The smart city concept, therefore, presents the adoption of ICT and technology to help in the proper management of city resources (Desdemoustier *et.al.*, 2019). The smart city concept "*aims to enhance the quality and performance of urban services such as energy, transportation and utilities, in order to reduce resource consumption, wastage and overall costs and improve the quality of life*" (Allam and Newman, 2018). As such, the main objection of the incorporation of smart technology in cities should be to improve efficiency and the delivery of services first. Priorities or intentions that include showcasing cutting-edge smart technology should not be the main objective of any smart city. Instead, cities would benefit from using smart technology pragmatically to help resolve urban challenges.

6.4. Discussion: The relevance of the Greater Lanseria Master Plan in relation to Zandspruit

The GLMP was received as a directive straight from the Gauteng Office of the Premier as a high level, politically endorsed project that had to be elevated into local plans. As such, municipalities implicated within the master plan had to face the challenge of aligning the GLMP objectives with their current spatial vision and framework. The City of Johannesburg is determined to align it with the City's development strategies. The city commends the objectives of the GLMP as a good reflection of sound town planning and align with the guiding principles of the SPLUMA Act 16 of 2013. The objectives also align with the CoJMM's spatial vision of a compact, polycentric city with mixed use development and sustainability underpinned by transit-oriented development. As such, both the GLMP and the Johannesburg SDF agree on guiding principles but disagree on the location of the proposed Lanseria Smart City.

Public participation processes have been conducted to ensure that the needs of affected communities and stakeholders are addressed. The project is still engaged in extensive research and analysis of the potential impacts of the development on residents. Bi-Weekly progress meetings are held to address challenges that emerge as the project progresses. The current meetings are focused on monitoring the progress and challenges regarding the GLMP and the Lanseria Smart City (GAPP *et.al*, 2024). The latest meeting highlighted a new development, the Crossroad, increased concerns around uncoordinated planning and the need for clarity on the project (GAPP *et.al*, 2024). This comes after an article published in IOL revealed the development of large warehouses on Cavaliers land treatment plant near the Lanseria airport. This prompted the need to arrange an emergency meeting with CoJMM planners to address the issue (GAPP *et.al*, 2024). There has also been a proposal to designate 530 hectares for the development of a SEZ north of the airport, spanning from Johannesburg and Mahalapiye, to manage urban development and protect environmentally sensitive areas (GAPP *et.al*, 2024). This indicates the clear commitment by representatives of the smart city project, to ensure that the objectives of the GLMP are met.

In its attempt to align its spatial objectives with the GLMP objectives, one of the two development principles of the Zandspruit Urban Development Framework is "To promote economic development and job creation with a focus on economic upscaling and industrial/commercial business uses". The ZUDF recognizes the location of the Zandspruit area within the GLMP and highlights the need to support the industrial and business nodes in

the master plan. As such, the ZUDF supports the development of (i) the Lanseria mixed-use and commercial warehouse node, (ii) the Lanseria Industrial Development north of the N14 and (iii) the Muldersdrift Business/mixed use area (JDA *et.al*, 2024:43). This informs the development objectives of the ZUDF, which respond to the (i) natural environment, (ii) movement network, (iii) economic activity, (iv) community facilities, (v) residential and (vi) infrastructure (JDA *et.al*., 2024: 45). The third objective focuses on the promotion of economic development and job creation with a focus on economic up scaling and industrial/commercial business uses. The fourth aims to provide a range of highly accessible facilities to serve the community residents. These two objectives are a direct response to the challenges of the Zandspruit area.

While the idea of the Lanseria Smart City was proposed as a dream by President Cyril Ramaphosa, there have been extensive consultations and research underway to ensure that this becomes a reality. While the GLMP was published as a high level, politically endorsed master plan, local municipalities such as the CoJMM are committed to aligning their frameworks and local frameworks with the vision and objectives of the GLMP. Current publications of the ZUDF reveal the acknowledgement of the Lanseria Smart City project, with current socio-economic strategies developed to address the needs of Zandspruit residents and ensure their inclusion in the project. There is a clear determination to ensure that no one is left behind or negatively affected by the Lanseria mega project. So far, the project seems to be taking necessary steps to ensure that the project is well-integrated with neighbouring cities and development. However, clear evidence as to whether the project will relevantly accommodate previously disadvantaged communities such as Zandspruit can only be deduced once the actual project has broken ground.

6.5. Reflection on the methods

The attendance of conference meetings provided insight into discussions around the smart city concept. This provided an insight into current perspectives on the increased focus on smart city developments, enabling the analysis to go beyond an analysis of current literature on this phenomenon. Attending progress meetings offered the opportunity to have a front row seat into the discourses that take place in the development of the Lanseria Smart City mega project. This enabled the development of an in-depth understanding and observation of the planning process. This process allowed for the opportunity to observe how planning theory about planning is translated into planning as a practice, an experience that would not have

been possible for an independent researcher. While the research would have benefitted more from learning about the different perspectives regarding the Lanseria Smart City from Zandspruit residents themselves, the commitment expressed by the project representatives to deliver an integrated, inclusive development is evident.

6.6. Recommendations

This research identified the need for increased coordination between the CoJMM with the GLMP project representatives concerning uncoordinated planning within the GLMP study area. Potential developments such as the large warehouses could undermine the vision of the GLMP. As such, more engagement is needed to promote transparency and proper alignment of developments in the GLMP study area. The development proposals of the Zandspruit Urban Development Framework align with the envisioned development of the GLMP study area. There are currently 41,9% of households residing in informal dwellings within the study area. The area also has seen increased population growth due to the economic opportunities available around the area. Therefore, the successful development of the Lanseria Smart City will result in increased immigration into the area. Additionally, 48.3% of households in the study area fall within the middle-income household and 50% of households which are low-income households. This increases the need for both the CoJMM and project representatives to develop inclusionary housing and social amenities to accommodate low-middle income residents. It might also be useful to consider planning for and accommodating backyard developments, as these are becoming more prevalent in township landscapes as an affordable housing option. There is a need to plan and prepare for the potential development or expansion of informal settlements within the study area. This research, therefore, recommends the assessment of the current housing subsidy model to ensure that the model includes specific interventions such as the backyard development economy. Municipalities should be in a position to adhere to and be able to prepare for the potential mushrooming informal settlements and persistent land invasions within the GLMP study area.

6.7. Areas for further research

Time constraints of completing the research led to the development of a focused narrative regarding the GLMP from officials. Attempts to understand the extent to which the GLMP objectives aligned with different government departments both internally within the CoJMM and externally within the departments of the Gauteng provincial government were given less attention. Less attention was also paid to the perspectives of Zandspruit community residents.

Further research studies could, therefore, focus on capturing the perspectives of Zandspruit residents in relation to the GLMP. This could complement the perspective of townships from a policy perspective to seeing their experiences from a local perspective. This could enrich the GLMP objectives and promote the development of smart city solutions that address challenges experienced within township landscapes. It could also help redefine policy, as lived experiences research could raise awareness on issues such as policy misalignment, which could delay the implementation of the GLMP.

In addition, more research is needed for the role of different government departments in the alignment of master plans and development frameworks. This could be done to assess the level of integration between departments and how the incorporation of smart tools could help with developing more transparent practices. The research was limited to the CoJMM and the recommendations made regarding the assessment of the GLMP only apply for the CoJMM and might not necessarily apply for the Mogale City Local Municipality and the City of Tshwane Metropolitan Municipality. This calls for a similar study on both these two municipalities, which may help in the development of implementation guidelines for the GLMP.

6.8. Conclusion

The GLMP represents a bold vision of urban development in South Africa, however, its success depends on its ability to address the socio-economic and spatial inequalities that characterize the region. The research highlights the following keypoints:

- Alignment with Local Context: The GLMP's objectives aligne with the principles of sound urban planning, such as compact, polycentric development and transit-oriented growth. However, the lack of alignment with local frameworks like the Johannesburg Spatial Development Framework (SDF) creates challenges for implementation. Greater coordination between the GLMP and local municipalities is essential to ensure that the project is integrated and contextually relevant.
- Inclusivity and Public Participation: The limited engagement with Zandspruit residents and other affected communities raises concerns about the inclusivity of the project. Public participation processes must be strengthemed to build trust, address community concerns, and ensure that the project benefits all socio-economic groups, particularly low-income households.
- Potential for Socio-Economic Transformation: The GLMP has the potential to stimulate economic growth, create jobs, and improve living conditions. However, this potential can only be realised if the project prioritizes affordable housing, access to services, and the inclusion of marginalized communities. The ZUDF's focus on in-situ

upgrading and economic development provides a valuable framework for addressing these challenges.

- Governance and Leadership: The success of the Lanseria Smart Citydepends on effective governance, political will, and the capacity of local municipalities to implement the GLMP's objectives. The emphasis on institutional capacity and good leadership is critical, however, it must be complemented by transparent decision-making and accountability.
- Recommendationd for Future Research and Policy: Further research is needed to capture the perspectives of Zandspruit residents and assess the alignment of the GLMP with the objectives of other municipalities involved in the project. Policymakers should also consider revising housing subsidy models to accommodate backyard developments and informal settlements, which are becoming increasingly prevalent in townships.

In conclusion, the GLMP represents a significant opportunity to redefine urban development in South Africa. However, its success depends on its ability to address the socio-economic and spatial inegqualities that persist in the region. By prioritizing inclusivity, public participation, and alignment with local realities, the Lanseria Smart City can serve as a model for sustainable and equitable urban development.

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