



**ADOPTION OF SMART CITY AGENDAS: EXPLORING THE CASES
OF CAPE TOWN AND NAIROBI**

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STATEMENT OF AUTHENTICATION

I, Nalukui Malambo (student number: 964995), hereby declare that this thesis is my own unaided work, and is, to the best of my knowledge original as acknowledged in the text. I have not submitted this material previously for assessment either in whole or in part, for a postgraduate qualification at this or any other institution.

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.....
Date

DEDICATION

I dedicate this thesis to my family

For your unwavering love, support and encouragement

ABSTRACT

Governments are considering alternative ways of better managing city services in response to the many social, economic, political, cultural, environmental, organisational and technological challenges which arise as a result of the expanding world population and increased levels of urbanisation. City governments around the world, and more recently in Africa, are looking for new ways in which to deal with and manage these changing dynamics. One way is through the adoption of Smart City agendas. African cities are adopting Smart City agendas; however, there is no understanding or clarity on whether these agendas are adopted to serve the interests of local residents, the private sector or other stakeholders.

This study explored how African cities are adopting Smart City agendas, with the objectives of: (i) understanding what motivates African cities to adopt Smart City agendas; (ii) how cities arrive at the objectives (e.g. priorities, anticipated benefits and beneficiaries) of their Smart City agendas; (iii) how cities set about adopting their Smart City agendas (e.g. what models or approaches) are used in setting up Smart City agendas.

The research used a comparative case study of two African cities: Cape Town (South Africa) and Nairobi (Kenya). The study made use of primary and secondary data sources. A qualitative analysis of the data was performed using thematic analysis to identify themes, context and relationships, and to provide answers to the research questions through the theoretical lens of stakeholder theory.

The findings of the study reflect that reasons for adopting Smart City agendas are varied but, can be categorised as social, economic, environmental and technological. The study found that the objectives of the agendas are set to realise institutional optimisation, harness technology and unleash citizen potential for improved quality of life. Contextual conditions, leadership style, size and scale of project influence the approaches used to setting the Smart City agendas. Ultimately, the agendas for Cape Town and Nairobi are not isolated list of ideas cities are pursuing, they are derived from the country's vision set to address each city's unique contextual conditions, challenges and opportunities.

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LIST OF ABBREVIATIONS

ACM	Association for Computing Machinery
ADB	African Development Bank
BPO	Business Process Outsourcing
CBD	Central Business District
CCTV	Closed-circuit Television
CEO	Chief Executive Officer
CIO	Chief Intelligence Officer
EGS	Economic Growth Strategy
ERP	Enterprise Resource Planning
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GIS	Geographic Information Systems
IBM	International Business Machines
ICT	Information Communications Technology
IDP	Integrated Development Plan
IFC	International Finance Corporation
KEPSA	Kenya Property Association
LED	Light-emitting Diodes
NDP	National Development Plan
NGO	Non-governmental Organisation
NIUPLAN	Nairobi Integrated Urban Development Master Plan
NMR	Nairobi Metropolitan Region
NUDP	National Urban Development Policy
PPP	Public-private Partnerships
QOL	Quality Of Life
SCID	Smart City Initiative Design Framework
SFA	Strategic Focus Area
UN	United Nations
UNEP	United Nations Environment Program
WEF	World Economic Forum

CHAPTER ONE: INTRODUCTION

1.1 RESEARCH STUDY BACKGROUND

Governments around the world are considering alternative ways of better managing city services in response to the many social, economic, cultural, environmental, organisational and technological challenges, due to the expanding world population and increased levels of urbanisation (Neirotti, De Marco, Cagliano, Mangano & Scorrano, 2014). These challenges include traffic congestion, environmental pollution, increasing demand for natural resources and basic services such as water, housing, healthcare, education and infrastructure. In order to address these pressures, city governments are examining better ways of managing these issues and at the same time, transform cities for economic growth to improve the quality of life (QOL) of residents (Neirotti et al., 2014). Smart City initiatives are part of a strategic response by governments to these challenges and opportunities presented by urbanisation and the rise of cities as a central point for social and economic development (Ojo, Curry & Janowski, 2014).

The incidence of population growth has a bearing on resources and public infrastructure as it places a high demand on water, sewage, energy, housing, roads, health care and educational facilities and other basic necessities (Caragliu, Del Bo & Nijkamp, 2009; Komninos, 2008; Ojo et al., 2014). In a positive light, this poses as an opportunity for cities, to redesign and recreate their spaces into new dwellings and workplaces, and reconcile competitiveness with long-term sustainable development using digital technologies and ICTs. Additionally, the adoption of Smart City agendas in the last decade is attributed to the claimed benefits it offers in enabling efficient and effective administration, improved service delivery and promoting engagement and transparency in private and public institutions. These benefits ultimately contribute to an improved quality of life for citizens as well as enabling cities to become globally competitive (Mahizhnan, 1999). In regions where the Smart City concept has been actively pursued, the primary objectives are linked to local challenges or opportunities present in the city. For example, Singapore's primary objective for initiating a Smart City agenda sixteen years ago was due to the desire by the government to improve citizens' quality of life (Mahizhnan, 1999).

Literature reporting on the effectiveness of Smart Cities shows that cities like Tokyo, London and New York have seen significant benefits from Smart City agendas in the form of better energy management through the implementation of smart utilities, including a reduction in carbon emissions as public transportation channels have been improved and more people use public transport instead of personal vehicles (Kogan, 2014). Reports indicate that this has had a positive bearing on congestion and pollution (Angelidou, 2014). In cities like New York, London, Singapore and Barcelona, the benefits reported include: (i) improved quality of life through digital governance channels, (ii) better management of transportation channels, (iii) attracting knowledge-workers or the 'creative class' and (iv) improved environmental sustainability, resource allocation and management of resources such as energy and water (Kogan, 2014).

Despite the benefits reported, the setting and adoption of Smart City agendas is not always a smooth process (Ojo et al., 2014). The challenges that cities are reported to have dealt with in the process of setting Smart City agendas include: (i) obtaining buy-in from stakeholders, (ii) inclusion of poor areas in the programme, (iii) sustaining stakeholder interest and participation, (iv) resourcing and funding the programme due to high development costs, (v) obtaining residents' participation or insufficient engagement of city residents, (vi) lack of a deeper understanding of residents to actively and effectively engage them, and (vii) policy uncertainty and limited technology integration (European Innovation Partnership on Smart Cities, 2013; Ojo et al., 2014).

City governments are under pressure to move away from traditional approaches to urban planning and administration and find new ways of dealing with current issues. The challenge for most is to find efficient and effective solutions to positively transform cities. According to Landry (2000), smart solutions can only emerge in a process of 'new thinking', as a strategic tool and self-reinforcing mechanism through which people can find their own tactical solutions.

From the case studies reported in the literature (Anthopoulos, 2015; Ojo et al., 2014), approaches towards the adoption and setting of Smart City agendas also differ considerably. This is because Smart City services or infrastructure developments are usually set up by different stakeholders, namely by central public

authorities, in partnerships with public and private sectors and civil society and sometimes by private organisations (Lee & Lee, 2014). For some cities, formal committees are established to oversee cooperation within the city, while other cities establish dedicated organisations to support smart technology developments in terms of planning, management and roll-out (Lee & Lee, 2014). For instance, three cities, Curitiba, Masdar and Singapore, all created think-tank institutions to support the development and implementation of the Smart City programmes (Anthopoulos, 2015). This participation and co-function actions in Smart City initiatives include building multi-stakeholder partnerships with industry, academia and residents for the successful development of Smart Cities' programmes (Anthopoulos, 2015).

In Africa, interest in the new forms of urban development, similar to those observed in Europe or Asia, appearing as Smart Cities is gaining momentum (Watson, 2014). Urban development projects tend to take the form of an economic development agenda contained within a national long-term development plan. However, other cities in Africa have also explored other models and approaches to urban development such as those observed in Tanzania Dar-es-Salaam (Halla, 2002). For the purposes of this study, it is important to note that the study is not concerned with the implementation and evaluation of Smart City projects; rather the study focuses more closely on the adoption and setting up of Smart City agendas in Africa.

1.2 SMART CITY AGENDAS IN AFRICA: CAPE TOWN AND NAIROBI

In 2002, the City of Cape Town announced the City's Smart City strategy. The objectives of the strategy were to 'reposition Cape Town as a leading player in the new global knowledge economy' (City of Cape Town, 2002, p.8). Its focus was on the way local government delivered services to residents. The strategy had four key focus areas which included: leadership, policy and regulatory environment, city and people development and e-governance.

However, in 2012 the City of Cape Town's Integrated Development Plan for the period 2012 to 2017 was released. It contains a digital city strategy. The agenda is based on the review of the initial Smart City agenda of 2002 which had evolved over time. The intent of the agenda was to direct and shape future Smart City initiatives and investments in a concerted way for the betterment of the City and all its citizens. It focuses on four key areas: digital government, digital inclusion, digital

economy, and digital infrastructure. The details of the agenda based on Figure 1 are addressed in greater detail in chapter five of this study.



Figure 1: Cape Town digital strategy. Source: Integrated Development Plan of Cape Town (2012).

In 2008, Kenya released a new vision for the nation called the Kenya Vision 2030. It contains the Nairobi Integrated Urban Development Master Plan (NIUPLAN) for the period 2014 to 2030. This plan contains an agenda to transform the Nairobi county region into a world class African metropolis through Smart Cities. The development master plan proposes some six satellite Smart Cities, one of which is Konza Technology City. The round table ideas listed on the Smart City agenda of Nairobi prioritises six thematic areas to address, namely (i) transportation, (ii) governance and institutions, (iii) environment, (iv) land use and human settlements, (v) social system and urban economy, and (vi) infrastructure. Similar to that of Cape Town, Nairobi's urban development plans seem to be promoting digitally connected living for residents and all other related stakeholders, hence the strong focus on the adoption and implementation of ICT infrastructure. However, it is important to note that these cities are directing their Smart Cities' efforts into specific areas based on local contextual conditions.

Cape Town and Nairobi are two African cities reported to have adopted Smart City agendas, but the reasons, factors and objectives for the adoption of the agendas are not confirmed.

1.3 RESEARCH PROBLEM STATEMENT

African cities are adopting Smart City agendas, but we have no understanding or clarity whether the agendas are adopted to serve the interests of the residents of these cities, or the interests of developers, businesses, investors and big corporations. Watson (2014) highlights the fact that the new trend in city building in Africa appearing in the form of new plans or master plans, hold the promise of better economic opportunities and social benefits, while alleviating the challenges of urbanisation. However, instead of addressing existing social exclusions, the plans seem to reinforce long-standing social inequalities (Datta, 2015; Watson, 2014). It is likely that cities potentially risk the following: agendas not meeting resident's needs, expenditure being misdirected, and corporate greed that exploits African cities and widens inequalities as a result of the Smart City initiatives. Against this background, understanding the reasons and the processes for the adoption of Smart City agendas is important because the ways in which agendas are set is likely to influence what is done and who benefits.

The purpose of this study was to explore why and how African cities are adopting Smart City agendas, how they arrived at the set objectives (e.g. priorities, anticipated benefits and beneficiaries) for Smart City agendas and, the approaches or models used in setting the agenda. This research examined how two African cities, Cape Town and Nairobi, developed their understanding of a Smart City agenda within the African context. The research was not concerned with successes or evaluation of Smart City agendas; it was concerned with the processes employed in setting the agendas. This area of study on Smart Cities in Africa remains under-researched; hence this research has sought to grow an understanding of these questions.

1.4 RESEARCH ISSUES INVESTIGATED

The primary research question is as follows:

Why and how are African cities adopting Smart City agendas?

The secondary research questions are as follows:

- i. Why are African cities adopting Smart City agendas?
- ii. How do cities arrive at the objectives (e.g. priorities, anticipated benefits and beneficiaries) of their Smart City agendas?
- iii. How are cities going about setting up their Smart City agendas? (What models or approaches are used in setting up Smart City agendas?)

1.4 SIGNIFICANCE OF STUDY

This study aimed to explore the adoption of Smart City agendas in the African context. It provides an understanding of the motivations behind the adoption of the Smart City agendas, the objectives of the agendas including the models/approaches adopted in setting these agendas. In doing so, this research aimed to contribute to theory and practice in the following ways in the next section.

1.4.1 Theoretical contribution

This study made use of stakeholder theory as a lens through which to conduct the study. The study contributes to theoretical knowledge in the adoption of Smart City agendas in the following: identification and prioritisation of the stakeholders; the roles they play and their responsibilities; beneficiaries of the agendas, including the processes and mechanisms used in establishing and adopting Smart City agendas within the African context.

1.4.2 Practical contribution

The Smart Cities' phenomenon is a relatively new concept within the African context; therefore, the study contributes towards understanding and documenting Smart City initiatives in Africa. The study provides insight into how cities can adopt different approaches to the development of their agendas. The study will enable us to better understand how cities go about setting these Smart City agendas and determine who is involved in the process. Further, the outcomes of this study contribute towards a larger study of 'Information Systems for Smart Cities in Africa', a project of which this research forms a part. However, it is important to note that the findings of this research are unique to the socioeconomic context of each city and cannot be generalized to other cities.

1.5 CHAPTER OUTLINE OF THE THESIS

Chapter 1: Introduction and research issues to be investigated

This study consists of seven chapters. Chapter one describes the background of the study; research problem; aim; research objectives and significance of the study.

Chapter 2: Literature review and theoretical framework

Chapter two consists of the literature review related to Smart City agendas as adopted by various cities around the world. This is followed by arguments from literature on the theoretical framing of Smart City agendas within the African context, the benefits and implications within the African context.

Chapter 3: Research methodology

Chapter three details the research design and methodology used for the study. It shows in detail why an exploratory case study procedure was the appropriate technique for this research. Thereafter, an overview of methods, data collection procedures and data analysis process and techniques are discussed.

Chapter 4: Why African cities are adopting Smart City agendas

Chapter four presents the findings and results of the study in relation to the first objective as stated in chapter one. Specifically, the objective set out to understand why African cities are adopting Smart City agendas. Thereafter, analysis of the findings and conclusions will be presented.

Chapter 5: Objectives for setting Smart City agendas

Chapter five presents the findings and results related to the second objective of the study. Specifically, the objective set out to determine how cities arrive at the objectives (e.g. priorities, anticipated benefits and beneficiaries) of their Smart City agendas. Thereafter, analysis of the findings and conclusions are presented.

Chapter 6: Models and approaches adopted for setting Smart City agendas

Chapter six presents the findings and results related to the third objective of the study. Specifically, the objective set out to understand how cities are going about setting up their Smart City agendas (i.e. what models or approaches are used in setting up Smart City agendas). Thereafter, analysis of the findings and conclusions are presented.

Chapter 7: Discussion and conclusions

Chapter seven discusses the answers provided to the three sub-questions and synthesises the results to answer the main research question. The chapter ends with a conclusion and suggestions for future research directions.

CHAPTER TWO: LITERATURE REVIEW

2.1 CONTEXTUALISATION OF THE RESEARCH

2.1.1 Smart City: Concept and definition

The 'Smart Cities' concept is evolving as an approach to mitigate and remedy current urban problems and make urban development more sustainable (Alawadhi et al., 2012). The concept is reported to have appeared in scholarly literature in early 1998 (Anthopoulos, 2015). A Smart City can be viewed broadly and concerns the interdisciplinary studies of information communication technology (ICT), urban planning and growth, e-government, public administration and various other disciplines. The term 'Smart City' is used widely and interchangeably with terms such as intelligent city, knowledge city, wired city, digital city, creative city, information city, virtual city, amongst others (Caragliu et al., 2011). However, for the purposes of this study, the term 'Smart City', will be used as it is the term that has been widely adopted to represent a new form of urban development for cities.

The section below provides a brief outline of the many working definitions of a Smart City from the perspectives of various academic, business and international institutions, such as non-governmental organisations (NGOs), governments, consultancies and technology and software vendors.

Historically, the concept of a Smart City has evolved in definition and meaning; originally its focus was centred on the role of ICT. For example, Hollands provides a definition focused on technology as; 'the utilization of networked infrastructure to improve economic and political efficiency and enable social, cultural and urban development' (2008, p. 307). This definition has since been critiqued as having been coined at a time in history when ICTs were gaining momentum, the main idea being that of a wired city as the central development model and connectivity a source of growth (Caragliu et al., 2011). In 2009, the IBM Institute for Business Value introduced a seven axes model to illustrate how cities can optimize seven core systems in order to improve sustainable prosperity. The model envisions a Smart City with three main characteristics namely, instrumented, interconnected and intelligent. Instrumentation relates to sourcing of real-time, real-world data from both physical and virtual sensors; interconnectedness is through using and sharing such

data across multiple processes, systems, organisations, industries or value chains. Intelligence relates to the effective connections of the physical to the virtual world (IBM, 2009).

Over the years as the Smart Cities concept gained momentum in adoption and use, the definition has progressed to include aspects that are considered softer, such as social and cultural elements. The definition below by Caragliu et al. (2011) captures this:

“We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance” (Caragliu et al., 2011, p. 16).

This definition resonates with Kourtit et al. (2014) whose argument is consistent with that of Caragliu et al. (2011). They state that, in recent years, the focus and debate on Smart Cities has shifted away from complex high-tech and architectural interventions, to include factors of economic development, the environment, human and social capital, culture, leisure and governance. Table 1 provides a consolidated view of some definitions of a Smart City.

Table 1: Smart city definitions

Definitions of Smart Cities
‘a city well-performing in a forward looking way in economy, people, governance, mobility, environment and living built on the smart combination of endowments and activities of self-decisive, independent and aware citizens’ (Giffinger et al. 2007, p. 10)
‘a city connecting the physical infrastructure, the IT infrastructure, and the business infrastructure to leverage the collective intelligence of the city’ (Harrison et al., 2010, p. 4)
‘use of smart computing technologies to make the critical infrastructure components and services of a city - which include city administration, educations, healthcare, public safety, real estate, transportation, and utilities - more intelligent, interconnected and efficient

(Washburn & Sindhu., 2010, p.2)

'a city combining ICT and web 2.0 technology with other organisational, design and planning efforts to de-materialize and speed up bureaucratic processes and help identify new, innovative solutions to city management complexity, in order to improve sustainability and livability' (Chourabi et al., 2012, p. 290)

'a city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance' (Caragliu et al., 2011, p. 16).

Adapted from Nam and Pardo (2011, p. 284)

The diffusion of Smart City initiatives across countries and continents with different needs and contextual conditions makes it difficult to identify a shared definition (Neirotti et al., 2014). Because of the ongoing debate, no consensus has been reached yet as to the exact meaning of the term Smart City or on what its describing attributes are. However, within the Smart Cities literature, there is general agreement about the common thread to the concept and its definition, that is, a wide use of ICT technology (Backhouse & Cohen, 2014), as an enabler that has helped cities manage and make better use of city resources (Nam & Pardo, 2011).

This study adopts the interpretation of Caragliu et al. (2011, p. 16) as a working Smart City definition:

A city is smart “when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”.

This definition has been adopted because it highlights the role of Smart City initiatives by stressing where a city ought to invest (human and social capital, traditional and modern communication infrastructure), what the goals are (sustainable development, economic growth and better quality of life) and how it

becomes smarter (through the wise management of natural resources and participatory governance) (Alawadhi et al., 2012).

In evaluating Smart City agendas, The European Union propose six axes against which a Smart City can be evaluated. These axes represent one way in which dimensions of a Smart City can be categorised. In evaluating Smart City agendas, there are various frameworks that could be used based on theories of regional competitiveness, transport and ICT, economics, natural resources, human and social capital, quality of life, and the participation of society members in city development (Caragliu et al., 2011).

Table 2: Dimensions of a Smart City as suggested by the European City Projects

SMART ECONOMY	SMART PEOPLE	SMART GOVERNANCE
(Competitiveness) <ul style="list-style-type: none"> ○ Innovative spirit ○ Entrepreneurship ○ Economic image and trademarks ○ Productivity ○ Flexibility of labour market ○ Embedded Internationally ○ Ability to transform 	(Social and Human Capital) <ul style="list-style-type: none"> ○ Level of qualification ○ Affinity to lifelong learning ○ Social and ethnic plurality ○ Flexibility ○ Creativity ○ Cosmopolitanism/Open-mindedness ○ Participation in public life 	(Participation) <ul style="list-style-type: none"> ○ Participation in decision-making ○ Public and social services ○ Transparent governance ○ Political strategies and Perspectives
SMART MOBILITY	SMART ENVIRONMENT	SMART LIVING
(Transport and ICT) <ul style="list-style-type: none"> ○ Local accessibility ○ (Inter-)national accessibility ○ Availability of ICT infrastructure ○ Sustainable, innovative and ○ Safe transport systems 	(Natural resources) <ul style="list-style-type: none"> ○ Attractiveness of natural conditions ○ Pollution ○ Environmental protection ○ Sustainable resource ○ Management 	(Quality of life) <ul style="list-style-type: none"> ○ Cultural facilities ○ Health conditions ○ Individual safety ○ Housing quality ○ Education facilities ○ Touristic attractiveness ○ Social cohesion

Adapted from Giffinger, 2007

The relevance of these axes and their associated dimensions has not been interrogated within the African context. The framework has been included in this section to provide context to and reference to the Smart Cities' historical emergence.

A more locally contextualised analytical framework identified by Backhouse and Cohen (2014), who examined Smart City services in terms of digitally connected living and informed living was used.

Backhouse and Cohen (2014), provide a distinction between digitally connected living and informed living as follows. Digitally connected living assumes that residents have access to the necessary applications, hardware devices, network infrastructure, and the requisite e-skills to access and make use of information resources. This definition focuses on the foundations of a city where networked infrastructure provides a platform for city services to be accessed anywhere, at any time (Backhouse & Cohen, 2014).

In South Africa, Cape Town serves as a good example of a city that promotes digitally connected living as a way of life. One-way Cape Town is promoting digital connectedness is through broadband connectivity throughout the city. By doing so, the city is enabling residents to have internet access and be connected to the city's services at all times. Socially, the need to connect groups considered under-privileged is met through the provision of PCs in public libraries in previously disadvantaged communities and provide for the easy access to other public services and amenities (Stimmel, 2015).

Informed living, on the other hand is conceptualised as the state where information systems facilitate the use of information to support decisions and actions in people's daily lives (Backhouse & Cohen, 2014) or an enhanced quality of life by informing (in the sense of Zuboff, (1988)) city services. According to Backhouse & Cohen (2014), informed living entails the usage and contribution to information sources in the following ways: finding accommodation and necessary utilities, ensuring health and safety, participating in economic activities such as finding employment opportunities, accessing and using transportation as well as finding and taking up opportunities for leisure, entertainment or cultural pursuits (which includes developing skills or knowledge towards taking up such opportunities) (Backhouse & Cohen, 2014, p. 2).

The central idea of informed living in a Smart City is supported by Khansari et al, (2013), who state that the premise of a Smart City is that, by having the right information at the right time, citizens, service providers and municipal government will make better and more informed decisions. Information systems are central to the process of meeting residents' need to have readily available and accessible information remotely or virtually. This means that residents do not have to travel long

distances or wait for extended periods of time for either information or services, this adds value to the overall quality of life for citizens and promotes the efficiency and sustainability of a city (Khansari et al, 2013).

The section that follows presents literature findings on the factors that motivate cities to adopt Smart City agendas.

2.1.2 Factors contributing to the adoption of Smart Cities

Literature reports that the reasons cities adopt Smart City agendas can be broadly categorised into social, economic, environmental and technological. Although the concept of Smart City adoption is relatively new in developing countries, there are lessons to be learnt from those countries that have adopted Smart City agendas in terms of what the reasons, problems or incentives are for adopting and setting these initiatives.

2.1.3.1 Social

A. Rapid urbanisation

The United Nations estimates that at some time between 2008 and 2009, the world's urban and rural populations became equal. It is estimated that by 2025 (in under ten years), the urban population globally will reach 5.5 billion, with an estimated 2.5% annual rate of increase. In the same timeframe, the urban population in developing regions will reach 4.3 billion (Khansari et al., 2014). Urbanisation is defined as the process by which rural areas become urbanised as a result of economic development and industrialisation (Peng, Chen & Chen, 2008). It also involves the growth of urban populations through the combined effects of migration and natural increase (Waugh, 1990 in Hove, Ngwerume & Muchemwa, 2013). Hove et al. (2013) add that the term urbanisation has features such as demographic processes (denoting the redistribution of populations from rural to urban settlements over time), necessary elements of economic and industrial development and is a driving force behind social change. However, the criteria for defining what is meant by the term urban vary between countries and regions. One of the differences between urban and rural is that urban populations live in much denser areas and are subject to rapid change as opposed to rural areas which tend to be less populated and slow moving (Peng et al., 2008).

Khansari, Mostashari & Mansouri (2014), argue that urbanisation has increased, especially in developing countries, with an average annual urban growth rate of 3.6% between 1950 and 2000. During the same time period, developed regions have experienced an urban growth rate of only 1.4% (Khansari et al., 2014). Increasing urbanisation has a bearing on the provision of services and governance of urban areas.

The African Development Bank (2012) reports that urbanisation is growing in both developed and developing countries. Africa is urbanising rapidly and continues to have one of the highest rates of urbanisation in the world (World Bank, 2013). It is currently estimated that about 320 million Africans live in urban areas, accounting for 37% of the African population (World Bank, 2013). As African cities continue to grow, projections indicate that between 2010 and 2025, African cities will account for up to 85% of the total population.

The rapid growth in population poses new challenges for city service management, resource allocation and infrastructure (Washburn & Sindhu., 2010). This is because population density has a bearing on different aspects of any city, regardless of size, such as environment, economy, quality of life, access to or availability of natural resources and infrastructure (Khansari et al., 2013). This rapid change has two dimensions: it creates challenges in managing critical aspects of urban areas, but at the same time, it creates new economic opportunities and social benefits (Washburn & Sindhu., 2010). To help alleviate the problems caused by urbanisation, the Smart City concept promises to capitalise on a city's economic opportunities and promote social benefits. The opportunity lies in the use of technologies for better managing the escalating issues in social and economic sectors (Washburn & Sindhu., 2010).

B. Safety and security

Creating a safe and secure environment for households and communities is very important for cities because a secure environment is an enabler of social development and is essential to public enjoyment of open spaces. A city is a place where residents and citizens ought to feel free and safe to live, work, learn, engage and develop (UN- Habitat, 2016). City authorities have the duty of protecting the city

itself and all that dwell in it, including residents, visitors and tourists. The UN-Habitat Report (2016), reports that 60 to 70 percent of urban residents globally have been victims of crime but more so in developing countries, where rapid urban population growth is at its highest. The prevalence of crime is higher where there is a combination of societal problems such as poverty and inequality between the rich and poor, unemployment and a history of violence. Holtmann & Swarts (2008) link this to ease of access to firearms, high levels of substance abuse and limited access to essential services as factors that fuel a society that is particularly vulnerable to victimisation and a higher incidence of violent crimes (Holtmann & Swarts, 2008; UN-Habitat, 2016).

C. Social inclusion and the digital divide

While urbanisation is believed to have provided opportunities in a globalising world, its effects and challenges in cities are multifaceted and varied. According to the World Bank (2015), despite wide recognition and commitment to create and manage cities with efficiency and safety, building inclusive cities remains a challenge. The concept of inclusiveness involves a complex web of multiple spatial, social and economic factors. Spatial inclusion involves providing for necessities such as housing, water and sanitation. Social inclusion involves supporting equal rights and participation, including the most marginalised. Economic inclusion focuses on creating jobs and giving city residents the opportunity to enjoy benefits of economic growth such as employment, job opportunities, business ventures and capital or funds (World Bank, 2015).

Digital divide refers to people who are cut off in some way from the benefits of mainstream society through lack of adequate access to ICTs (Trauth & Howcroft, 2006), a gap between ICT 'haves' and 'have-nots', the division between those who have real access to ICT and are using it effectively, and those who don't have it (Kaba & Said, 2016). The term covers groups, including nations, across divides of awareness, adoption, knowledge, skill, social capital, devices, language and literacy, use, activities and outcomes of ICT (Rice & Pearce, 2015).

For a city to become representative of the majority interest's, empowerment and access need to be addressed and this requires an understanding of the extent to which marginalised groups are excluded socially, economically and politically

(Odendaal,2006). ICT is believed to offer potential to empower people, especially in African countries, to overcome development obstacles, address social problems, strengthen communities and yet the digital divide which exists in most countries in Africa separates those who can access and use ICT to gain the benefits from those that cannot (Coetzee, 2007)

Along with the development of a Smart City agenda in which ICT was one of the core strategies, the City of Cape Town undertook an assessment of the digital divide in Cape Town, in order to understand where it's citizens, communities, and institutions stood in terms of ICT and the potential benefits of ICT use for social and economic development (City of Cape Town, 2002). The assessment examined the access to, use of, and need for ICT in Cape Town, with a special focus on the millions of people that live in disadvantaged communities. The citywide assessment was designed to examine the complex interrelated issues that determine how effectively ICT is, and could be used to gain tangible benefits.

Although this assessment was conducted fifteen years ago, it is relevant to this study as a point of reference in terms of literature. It gives background understanding to the ways in which a South African city like Cape Town is aware that, although systems and structures such as those of the Apartheid era are being done away with, economic and social divides are still perpetuated by differences in digital literacy including factors such as: skills, access and use (Coetzee, 2007, Bridges.org, 2002). Studies and assessment such as these are indicative of the commitment a city has towards its citizens to deal more effectively with the growing digital economy.

2.1.3.2 Environmental

As more people migrate to urban areas, the strain imposed on cities' already limited resources and basic services like energy, water, roads, schools, housing, hospitals and transportation often leads to either scarcity or pressurised rationing (Washburn & Sindhu., 2010). Not only are these resources and services limited in supply, they are often poorly managed. As a result, there are inconsistencies in how they are distributed, managed and contained (Washburn & Sindhu., 2010).

On a global scale, the conditions of many of the natural resources in cities have become inadequate with alarming shortages due to the demand by rapidly growing populations (Washburn & Sindhu., 2010). The essential areas in which cities feel pressure in terms of management, distribution and accountability are power, water, land, and infrastructure. This is especially evident in developing countries, where service outages and interruptions are in some places a daily occurrence.

For this reason, many cities are feeling under pressure and realise a need to find new ways of managing and rationing key resources, services and infrastructure. For most, transforming their cities into smarter cities is considered as an alternative response strategy as compared to the traditional means or methods of managing a city (Washburn & Sindhu., 2010). The alternative is driven by the potential and capability provided by technological advancements in ICT and how technology has demonstrated its usefulness in automating and streamlining manual processes for resource management and dissemination.

2.1.3.3 Economic

Urbanisation offers improved economic opportunities and larger cities hold the promise of employment in increasingly service-based economies (Washburn & Sindhu., 2010). Some cities, based on good links with the global system of cities and trade, can be more internationally competitive (Roberts & Hohmann, 2014). Such cities contain concentrations of large multiple-industry clusters and have a commanding position in global trade investments (Roberts & Hohmann, 2014). Countries that seek to measure and encourage greater competition between their cities, such as Switzerland, and more recently, India and China, are forcing local governments to take measures to enhance city competitiveness and their ability to attract jobs and investments (Roberts & Hohmann, 2014). Therefore, becoming smart includes fostering a competitive economy, competition and competitiveness. The physical transformation of cities into new and modern structures seems to be an attractive form of Smart City initiative (Angelidou, 2014).

African cities are at an advantage in terms of knowledge growth and investment opportunities due to their emerging urban middle class, a larger youth population and the availability of virgin land (Black & Veatch, 2016). Africa's youth is projected to constitute the largest labour force in the world by 2040, and research by the World

Bank (2013) on African development indicators reports that most African economies are being driven by the middle class who provide large consumer markets due to their spending power. These factors are attracting local and international investors to African cities. But, despite these positive indicators, the infrastructure that ought to encourage trade and investment for economic advancement and better placement for competitiveness is lacking in most African cities (World Bank, 2013). The ways in which developed countries are competing in globalised economies is through the creation of new knowledge, innovation, and technological advancements (Tchamyou, 2016). These are identified as factors that stimulate economic growth, improve employment opportunities, provide higher wages and ultimately enhance competitiveness of cities within developed countries (Tchamyou, 2016).

Economic growth from greater urbanisation is often aided by the application of ICT. The ways in which ICT is contributing towards economic productivity and competitiveness in Africa is in the area of efficient services, logistics, transportation, agriculture and organisational change. For example, in some companies, ICT facilitates access to new forms of business in the services industry, through the exploitation of big data and informatics. This can assist companies to effectively track and map changing customer trends, match inventory stock levels through data generation and improvement in the supply chain of manufacture and retail outputs. ICT is also used to promote workplace organisational change and efficient communication through computing science (Tchamyou, 2016).

2.1.3 Objectives for Smart City adoption

Just as there are many reasons that contribute to the adoption of Smart Cities, the literature on Smart City adoption indicates that there is a myriad of objectives that city governments pursue through their Smart City agendas. A Smart City's ultimate goal is to create sustainable value for citizens, employees, shareholders and other stakeholders (Lee & Lee, 2014). A study of ten major cities that implemented Smart City initiatives observed that, across all ten (based in the Netherlands, Sweden, Malta, United Arab Emirates, Portugal, Singapore, Brazil, South Korea, China and Japan), the common motivating factor for Smart City initiatives is economic growth (Ojo et al., 2014). In addition, the study also observed that, across all cases, Smart City initiatives aim at objectives (anticipated outcomes) that can be broadly

categorized into social, economic, environmental and infrastructural categories. These themes appear to be consistent across major cities with an agenda, although some have a specific focus such as social and economic, while others focus on environmental and infrastructure.

Table 3 lists some of the individual objectives and the anticipated benefits as outcomes for Smart City initiatives. This is a summary and not an exhaustive list. It is adapted from Ojo et al. (2014).

Table 3 : Objectives for Smart City adoption and anticipated outcomes

Smart City Objectives	Anticipated Benefits/Desired Outcomes
<ul style="list-style-type: none"> ○ Carbon reduction and neutrality ○ Achieving energy efficiency ○ Leveraging ICT to develop niche industries such as multimedia and knowledge-based industries ○ Attaining the highest quality living environment for residents or citizens ○ Developing green areas within the city ○ Developing state of the art information infrastructure accessible to all ○ Ensuring social harmony among different groups of residents ○ Evolving city as living laboratory to foster continued improvements 	<ul style="list-style-type: none"> ○ Less CO2 emissions ○ Less congestion ○ Energy use reduction ○ Use of solar or wind energy ○ Green space per residential unit ○ Recycling take up by residents and businesses ○ Improved standard of living ○ GDP contribution ○ Unemployment rate reduction ○ Employment and job creation ○ Investment friendly environment ○ Foreign direct investments ○ Recognition - including competitiveness

The case of Barcelona (Spain) records the city’s transformation from a traditional city to a twenty-first century modern city with a history dating back from the 1980’s (Bakici, Almirall & Wareham, 2013). The general objective for Barcelona’s Smart City agenda was to use ICT in order to transform the business processes for public

administration both internally and externally. The aim was to make these sectors more accessible, efficient, effective and transparent (Bakici et al. 2013). In line with this vision, the ultimate objective was to promote innovation, foster competitiveness internationally, create new channels of communication, facilitate access to information locally and internationally and improve the efficiency of public services (Bakici et al. 2013).

In Africa, specifically South Africa, Durban has had a Smart City agenda since the early 2000's (Odendaal, 2011). The main objective of the agenda has been to transform the City's operations with the intent of promoting efficiency, effectiveness and transparency through the adoption of ICT. The ultimate goal is that this will enhance the quality of life of residents locally and also promote Durban as a globally competitive city (Odendaal, 2011). Although Barcelona and Durban share similar objectives of transforming the City's operations through ICT, Barcelona's objective has a strong business focus (Bakici et al. 2013), while Durban articulates a strong focus on economic and social transformation. For Durban, this is partly due to South Africa's history in which communities were previously divided based on racial grounds (Odendaal, 2011). More detail of South African history is covered under section 4 of this thesis.

There are other cases such as Rio de Janeiro (Brazil), where the Smart City agenda focuses strongly on issues of safety and security (Schreiner, 2016). For example, the projects contained within the agenda addressing these issues use ICT capabilities to connect multiple networked systems in order to manage disasters, emergencies, and planned events (Khansari et al, 2013). This is reflected in the sort of initiatives implemented such as the disaster response centres and security centres that monitor the city 24 hours a day, 7 days a week (Schreiner, 2016).

The anticipated benefits of these initiatives are the ability to plan better prevention and rapid response to emergencies or disasters compared to previous times when technological advancements had not been central to the processes (Schreiner, 2016). However, although reports indicate that these initiatives are enabling the city to manage issues more urgently, critiques of the Smart City objectives (Jaffe,2016) are that Rio de Janeiro has failed to go beyond and address central issues such as improving human experience, inclusivity and bridging the technological divide

(Jaffe,2016). This point is supported by Watson (2014) who argues that new master plans such as those observed in African cities often disregard poor communities who are not able to afford the technology to engage with services and amenities.

Perhaps the challenge with cities adopting Smart city agendas is the rapid change that ICT or information systems have had to propel economic and social dynamics in society. It is worth noting that across all the cases referred to, ICT plays a significant and strategic role in enabling broader objectives. The belief is that ICT is used to reinforce and enable other larger strategic objectives for the economy, social objectives as well as improving the environment (Odendaal, 2011). The use and application of information systems in Smart Cities supports various benefits such as: making transport services accessible to citizens and commuters through real-time data on how best to exploit multiple transportation channels and providing information on the demands for utilities such as energy, water and transportation networks (Harrison & Donnelly, 2011).

2.1.4 Approaches adopted in setting Smart City agendas

Literature reports that there are two predominant planning approaches to Smart City development (Anthopoulos, 2015). These are top-down and bottom-up models. The top-down model requires that Smart Cities are planned, designed and developed based on certain blueprints. The top-down approach leans towards new city development. A new city can be planned with a focus on technology, efficiency, master planning, integrated infrastructure and data from centralized systems and components such as green buildings, smart grids and multimodal transport networks (Anthopoulos, 2015; Datta, 2015). Examples of new Smart Cities implemented using this approach include Songdo city in South Korea, engineered by private technology companies such as Samsung, Cisco and IBM, and deployed using a top-down approach (IEE Spectrum, 2011; Kogan, 2014).

However, critiques of these approaches argue that when this process is applied to city level development, it can turn problematic as it may become an imposition on residents. Such models may result in failure because they often exclude the interests of poorer communities (Jaffe, 2016; Watson, 2014). Nevertheless, the advantage is

that it eliminates time-consuming tasks of consultation with all the stakeholders involved.

In contrast, the bottom-up model requires improving existing cities with smart features (Anthopoulos, 2015; Datta, 2015), and usually includes the upgrade of an existing city in a phased manner. The bottom-up approach challenges the top-down approach based on the principle that Smart Cities are not rigid structures of lock-step orders, rather, they are more like individuals responding to subtle social and behavioural clues from their neighbours about which way to move forward (Ratti & Townsend 2011 in Anthopoulos, 2015). That is because, like humans, cities have peers (i.e. other cities with similar characteristics) from which insights on how to become smarter can be drawn (Angelidou, 2014).

In the bottom-up approach, people or city inhabitants act as agents of change in the creation of Smart Cities with supporting infrastructure. According to Anthopoulos (2015), there are four areas the bottom-up approach supports (i) relying on smart devices carried by people as sensors rather than relying only on formal systems embedded into infrastructure, (ii) delivery of services by means of citizen-to-citizen, (iii) making government data warehouses public to empower entrepreneurs, (iv) listening to residents frame their own Smart City vision.

Prior research within the European Union indicates that each Smart City initiative has been developed with an influence of local characteristics based on contextual conditions, namely political, economic, social and environmental (Boliver, 2015). However, Angelidou (2014) notes that before a city maps out a Smart City strategy for development, it is critical to note what is already in place and how it can be improved if it does not involve the creation of a new city from scratch.

By comparison with the top-down, the bottom-up approach to Smart City development engages stakeholders in the decision making process. There are two forms of bottom-up approaches. They are characterised as process-driven and by ownership. Process-driven can include improving and upgrading an existing city with smart features in a phased manner by the local municipality in consultation with residents (Anthopoulos, 2015). Ownership involves residents suggesting and making their own Smart City developments (i.e. determine the objectives and priorities) and

taking these to the city to implement. However, these approaches can be time-consuming, unpredictable and require a delicate balance between various stakeholders for consultation (Anthopoulos, 2015).

Although the commonly reported approaches to city planning are those mentioned above, cities within the African context have explored other city planning models or approaches based on the criticism of the blueprint master planned city (Halla, 2002). Tanzania is one such example and the urban development scheme adopted is that of strategic planning. According to Halla (2002), strategic planning is a dynamic framework for a city's stakeholders to implement their development decisions. He notes that, until the last ten to fifteen years, consulting firms and government urban development agencies have prepared general planning schemes using approaches of master planning that symbolise comprehensiveness and rigidity (Halla, 2002). These approaches have been criticised for their lack of active participation of representations from civil society and because of the exclusions of these plans, suggestions have been made for democratic planning processes that acknowledge rights in land and diversity of interests (Nnkya, 1999).

As such, suggestions and exploration of urban planning practices that are communicative and collaborative through negotiations with stakeholders are necessary (Nnkya, 1999). In the year 2000, the capital city of Tanzania (Dar-es-Salaam) adopted and implemented planning schemes that embody stakeholders' participation and partnerships. The underlying method to this citywide planning scheme is the adoption of the strategic urban development planning framework (SUDPF) that embodies priority setting and dynamism (Halla, 2002).

The SUDPF framework has two strengths. Halla (2002), notes that it includes firstly the inclusion of development stakeholders in all the activities of plan preparation and implementation through sensitization and information gathering workshops, issue-specific task forces, consultative plenary sessions, and implementation arrangements. Secondly, the built-in coordinating mechanism involving the SUDPF process, development control machinery and developers facilitates transparency and flexibility with regard to urban development implementation. These strengths seem to embody and promote transparency and information sharing among stakeholders to search for problem solutions and conflict resolution (Halla, 2002).

However, weaknesses of this framework, as learned in Tanzania include the risk that stakeholders work out strategies for addressing critical issues, but end up being unable to implement them because of their limited financial resources and this can demoralise stakeholders without sound financial backgrounds as was the case experienced in Tanzania (Halla, 2002).

2.1.6 Benefits and challenges of initiating Smart Cities in Africa

A World Bank report of 2013 reports that urbanisation is the single most important transformation that the African continent will undergo in this century. Almost-two thirds of Africa's population still live in rural areas but a steady flow of this population is migrating to urban areas in search of opportunities for employment, education and better living standards (Henderson, 2014). It is estimated that more than half of the African population will live in cities by 2040 (World Bank, 2013). Historically, African cities have been reported to be in a state of perpetual crisis in the adequate provision of basic services such as water, housing, health care and transportation, dating back to the late 1970s (Gandy, 2006).

Urban and rural migration research indicates that the challenges that African governments experience in planning for the demand of social and economic services are escalating to a complex level. The combination of demographic pressures, rapid urbanisation, rapidly diminishing resource bases and environmental shifts, represent a host of negative urban externalities in many African cities (UN-Habitat report, 2014). Population movements have rendered the current city planning models ineffective and there is a need to re-vision and rethink city development (Henderson, 2014). The urgency to address these issues is not only to manage and monitor economic, social and environmental resources but is also due to the rapid depletion and degradation of resources, like water and energy, which are vital for the development of any economy regardless of its size (Stren & White, 1989). Information Systems are central to these plans as they provide data for planning, better tools for managing cities and mechanisms for communication.

In response to the challenges, African cities in countries like Ghana, Nigeria, Kenya and South Africa to name a few, are have taken proactive approaches to deal with such issues through the adoption of Smart City agendas. This is reflected in new urban development visions and development plans observed on municipal websites

and in the media (Watson, 2014). There are many reasons attributed to why these countries are pursuing alternative processes and plans.

According to Watson (2014), local factors that are playing a role in the appearance of these new visions are the expected increase in the size of Africa's urban population, a growing middle-class and investment growth opportunities that fuel demand for land and property development. However, critics of these urban development plans argue that factors driving African cities to adopt Smart City agendas cannot be generalised at this point (Watson, 2014).

2.1.6.1 Benefits of Smart City adoption in Africa

According to Angelopulo and Hedrick-Wong (2013), the most significant new development in sub-Saharan Africa in the last decade has been the steadily growing rates of investment that seem to be a prime motivator for growth. MasterCard African Cities (2013) estimates that in the period 2005 to 2012, close to 20% of the GDP was from outside investors into the African market, as compared to the single digit levels recorded in previous decades. Africa's cities are poised to become powerful hubs for employment generation, financial and commercial services and technology, as a result of the consumer markets growing on a massive scale (Angelopulo & Hedrick-Wong, 2013). As a result, investments in public services like education, health care and transportation infrastructure present more of a strategic opportunity to fast-track investment and growth in cities than in scattered rural settlements (Angelopulo & Hedrick-Wong, 2013).

The African continent is very diverse and there is no doubt that foreign capital in search of investment opportunities would be influenced by particular local economies and income growth as well as political factors, land and banking conditions (Watson, 2014). Due to the growth potential observed in many African cities, governments are adopting strategies that will help alleviate pressures in the existing cities. These new strategies include the establishment of entirely new cities referred to as satellite or secondary cities or upgrades within the existing city.

2.1.6.2 The case of secondary cities in Africa

In Africa, many of the new urban development plans that reflect Smart City agendas take the form of new satellite cities adjacent to an existing larger city (Watson, 2014).

This trend is attributed to the strategic infrastructure, investment, and systems of supply chains and that satellite cities are becoming more linked to the scope of local economic activities (Roberts & Hohmann, 2014). Examples of new satellite cities in Africa labelled as 'smart' or 'eco cities' include those in Accra, Egypt, Kigali, Lagos and Nairobi. According to Roberts and Hohmann (2014), there are significant differences and some similarities in the way countries approach the development of secondary cities. Some cities have adopted policies that support decentralisation and encourage national and regional economic development, although the success rate for such initiatives is mixed. Other cities in developing countries have set up strong anti-urbanisation policies and actively try to prevent people from migrating to cities (Roberts & Hohmann, 2014). However, regardless of the approach chosen, private sector urban development on the African continent is becoming more evident through international property and technology companies developing new cities from scratch (Watson, 2014). According to a recent report by Grand View Research, the global Smart Cities market is estimated to reach \$1.4 trillion in 2020 making it a more lucrative market for IT corporate organisations. The global Smart Cities market comprises companies such as Oracle, Siemens, Honeywell, Cubic, Cisco, ABB, Accenture, Alcatel-lucent and IBM (Grand View Research, 2014).

Watson (2014) acknowledges the growth that investment opportunities bring to African cities. The concern is that some Smart City development plans tend to disregard the fact that the bulk of the population in sub-Saharan African cities is extremely poor and living in informal settlements. Most of these settlements are on urban land that is attractive to property developers and attempts to implement these development plans are having exclusionary effects on vulnerable low-income groups through evictions and relocations (Watson, 2014). What seems most likely in instances such as these is that the poor urban populations tend to find themselves disadvantaged and marginalized.

The concern expressed by critics of such new plans is the impact these new developments are likely to have on locals. Questions have been raised as to what extent these plans reflect the locals' interest and benefits, and whether locals are actively taking part in the planning, implementing, monitoring and sharing of the anticipated benefits (Watson, 2014). In development studies, researchers argue that

participatory development, whether urban or rural, should be a move away from developmental approaches that are biased towards euro-centrism and a top-down approach, which are likely to side-line local people's interests and voices. (Mohan 2001; Nnkya,1999).

Of interest to this study is to identify and distinguish between plans imposed or driven by external infrastructure developers such as ICT companies and property developers and those developed and driven by city governments to address specific local conditions, whether these be opportunities or challenges. The next section examines the literature related to stakeholder theory and its application to this study.

2.2 OUTLINE OF THEORETICAL FRAMEWORK

In this section, I discuss stakeholder theory as the theoretical framing for the study. I begin by presenting a brief history of its origins and the varied definitions of the term stakeholder. I then discuss the definitions of stakeholders in light of the study by showing different aspects and views on stakeholders by exploring literature from different fields, such as e-government, information systems, public administration and urban development. Finally, I explain the relevance of stakeholder theory in relation to the research study including its strength and weaknesses.

2.2.1 History of stakeholder theory

Stakeholder theory is said to have its origins in management literature (Mishra & Mishra, 2013). The term 'stakeholder' traces its origins to 1963 when it was introduced by the Stanford Research Institute, who defined it as 'those groups without whose support the organisation would cease to exist' (Mishra & Mishra, 2013: 256). The concept was further extended by Freeman (1984) in strategic management and since then, the stakeholder concept has been widely applied to different disciplines (Buchholz & Rosenthal, 2005). While each discipline defines the concept somewhat differently, each version generally stands for the same principal that organisations "should heed the needs, interests and influences of those affected by their policies and operations" (Mitchel et al., 1997 in Buchholz & Rosenthal, 2005, p. 137).

Stakeholders have been defined as "any individual or group who can affect or is affected by the actions, decisions, policies, practices or goals of the organisation"

(Carroll, 1996, p. 74); as “a group of constituents who have a legitimate claim on the firm” (Hill & Jones, 1992, p. 133); “any participant in corporate affairs” (Ackoff, 1974, p. 763); or “those that will be directly impacted by the decisions” (Friend & Hickling, 1987, p. 267). In transportation studies, a stakeholder refers to an individual, group or organisation affected by a proposed plan or project, or who can affect a project and its implementation (Lindenau & Bohler-Baedeker, 2014).

Donaldson and Preston (1995) classify stakeholder theory into three traditions, namely descriptive, instrumental and normative:

- i. Stakeholder theory is descriptive because it describes the corporation as a constellation of cooperative and competitive interests possessing intrinsic value (it offers a model of the corporation).
- ii. Stakeholder theory is instrumental because it establishes a framework for examining connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals (offers a framework for investigating links between a firm and stakeholders).
- iii. Stakeholder theory is normative in that it interprets the function of the corporation by describing what a stakeholder should do, based on ethical frameworks.

According to Donaldson and Preston (1995), although stakeholder theory is descriptive and instrumental, is it more fundamentally normative, because stakeholders are identified by their interest, and all stakeholder interests are considered to be intrinsically valuable. Stakeholder theory provides the benefit of determining who is key in a project, and if and how they can be managed (Mishra & Mishra, 2013).

Stakeholders can be divided into categories depending on the type and level of involvement in a development project and this categorisation will be provided in the next section.

2.2.2 Types of stakeholders

There are many ways in which to categorise stakeholders. Clarkson (1995 in De Schepper et al., 2014) categorises stakeholders as primary and secondary. Primary stakeholders are those groups that have a major impact on the survival of the

organisation. Secondary stakeholders are those who influence or are influenced by the organisation, but not engaged in transactions with the organisation and not essential for its survival.

The stakeholder identification and salience framework provided by Mitchell et al. (1997) gives guidance as to the conditions under which managers are likely to respond to stakeholders. These conditions are determined by the level of three stakeholder attributes which are (i) power, (ii) legitimacy and (iii) urgency. According to Mitchell et al. (1997), the power of stakeholders refers to their ability to mobilize social and political forces as well as their ability to withdraw resources from the organisation (Post, Preston & Sachs, 2002). Legitimacy is “a generalised perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions” (Suchman, 1995, p. 574). Controversy has surrounded the importance of legitimacy as a stakeholder attribute. Philips (2003) argues that legitimacy remains imprecise within the stakeholder literature and is an inconsistent attribute. Urgency on the other hand is, “the degree to which stakeholder claims call for immediate attention” (Mitchell et al., 1997, p. 864).

In the context of public-private partnerships, El-gohary, Osman & El-Diraby (2006) describe stakeholders as responsible, impacted or interested.

Responsible stakeholder refers to an organisation or individual who has some degree of responsibility or liability with regard to the development project, such as developers or IT companies. An impacted stakeholder is an organisation or individual who is directly or indirectly affected by the development process; these are classified into three main sub-domains: residents, users and owners. Impacted stakeholders are further grouped as negatively or positively impacted. Interested stakeholders are organisations or individuals that are not directly impacted by the project, but who would like to participate and provide their opinion in the development process. This category includes various actors, such as social institutions, environmentalists and media representatives.

2.2.3 Importance of stakeholder engagement

Stakeholder analysis is a process of identifying stakeholders and assessing their interest, influence and relationships (Reed, 2008). Stakeholder engagement is a process of communicating with parties involved to develop relationships based on common interests (Chinyio & Akintoye, 2008). Understanding the concepts that underlie stakeholder involvement in public-private partnerships related to infrastructure projects is essential towards creating strong involvement to help project proponents and stakeholders communicate effectively, co-operation among the stakeholders, buy-in and mutual support (El-Gohary et al., 2006). Reed (2008), stresses that engagement with stakeholders should be initiated as early as possible for projects related to the public because this is essential for stakeholder analysis and decision-making. In most public-private partnership projects, stakeholder relation is reported as one of the critical factors that determine the success or failure in key e-government projects (Scholl, Barzilai-Nahon, Ahn, Olga & Barbara, 2009 in Chourabi et al., 2012).

A common observation made by De Schepper et al. (2014) and El-Gohary et al. (2006) through the study of public-private partnership projects is that public opposition has been reported as one of the main reasons for failure. They add that the failure is mainly because the public was unaware of the existing partnerships, not sufficiently educated, or denied access to information (El-Gohary et al., 2006). Stakeholder issues do not only emerge because of misaligned expectations between different stakeholders involved, but because of the imbalance of reactive and proactive stakeholder management approaches, as well as an absence of any guidance on the responsibility and accountability issues surrounding the stakeholder management. El-Gohary et al. (2006) suggest that putting in place appropriate stakeholder management processes is crucial for the success of public-private partnership projects (De Schepper et al., 2014; El-Gohary et al., 2006).

2.2.4 Stakeholder implications for Smart Cities

In most public-related initiatives, individual citizens are usually not in a position to participate effectively in their own capacity, but might be able to do so through affiliation to a representative group, such as an NGO, church, club and so on (Lindenau & Bohler-Baedeker, 2014). Urban planning affects a great variety of

different economic, public and social interest groups positively or negatively, and often results in complex relationships between administrators and other groups having a stake in decisions made (Lindenau & Bohler-Baedeker, 2014). According to Lee and Lee (2014), one important challenge for Smart Cities is to combine the innovativeness of different parties through the formation and management of partnerships and alliances. Smart City programmes are complex and involve a wide range of partners and stakeholders responsible for different roles. These stakeholders and partnerships facilitate coordination, integration, participation, funding and any other relevant contributions that are required for the successful implementation of a Smart City initiative (Ojo et al., 2014). Within the business and management fields, there is wide agreement around the importance of ethics in management and public management due to rising scandals in business engagements. This has led concerns and calls for ethical behaviour by executives, and training in ethical standards for employees and other stakeholders (Noland & Philips, 2010). As such, the topic of stakeholder engagement is significant in public projects as it is important for leadership to consider questions about how to establish the ethical principles and standards required to guide moral behaviour and the decision-making processes. The idea is that organisations distinguish the exact nature of their obligation to stakeholders and identify power disparities that often arise between organisations and their stakeholders (Noland & Philips, 2010).

The argument by Noland & Philips (2010) aligns with Mitchell et al. (1997) who identify the conditions of stakeholder influence as power, legitimacy and urgency. Stakeholder theory provides a mechanism for identifying stakeholders as well as classifying them according to influence. For example, using stakeholder classification, residents and businesses are considered those that are impacted by the outcomes of the agendas. The dynamics between these stakeholders in terms of who has more power and how they exercise that power can be reflected in what is prioritised on the agenda and rationalised with legitimate claims. Impacted stakeholders' needs are often treated with legitimacy but not necessarily prioritised as urgent. This is reflected in residents, particularly poorer residents without economic power and inability to influence agendas. In addition, the theory assists in establishing what the needs and preferences of these stakeholders are and whether they reflect their interests and values. While government in this case assumes the

role of responsible stakeholder as the facilitator, other social groups such as clubs, educational bodies, legal experts and societies are classified as interested stakeholders.

2.2.5 The relevance of stakeholder theory to the study

Stakeholder theory was chosen as a lens through which to conduct this research for its principles and frameworks which are related to this research. Stakeholder theory essentially identifies who has input in decision making as well as who is impacted by the outcomes of such decisions. It was key to this study to distinguish between plans imposed or driven by external infrastructure developers such as ICT companies and property developers, and those developed and driven by city governments to address specific local conditions.

The theory and its principles were instrumental in identifying and examining stakeholders in the Smart Cities agendas undertaken by the case cities, as well as understanding why some stakeholders are prioritised over others. Stakeholder theory is relevant to this research as its principles and attributes assist in identifying and examining the connections between the various stakeholders (Mitchell, 1997, Osman & El-Diraby, 2006). The classifications assist in understanding the needs, interests and influences of these stakeholders (Rawson & Hooper, 2012). These classifications are relevant to this research in two main ways. First, they contribute to the understanding of the relational dynamics and connections within the city in terms of participation, ownership and requirements (Soste, Wang, Robertson, Chaffe, Handley & Wei, 2015). That is, it provides a framework for recognising the relevant constituencies and the logics for prioritizing and integrating interests such as who is involved, what role they play, as well as the benefits and value added (Crane & Ruebottom, 2011).

Secondly, it provides a mechanism for prioritisation of identified and classified stakeholders and how these relations are established, grouped, managed and maintained (Mishra & Mishra, 2013). This prioritisation is supported through a participatory planning process as suggested by Soste et, al (2015) through project governance and engagement processes.

2.2.6 Weaknesses or opposing views of stakeholder theory

Although stakeholder theory is widely adopted in fields beyond management and business and provides for the identification of stakeholders and principles around engagement and prioritization, critics of the theory argue that the theory lacks specificity around stakeholder identity (Crane & Ruebottom, 2011). The argument is that stakeholders are predominantly defined by their generic economic functions such as consumers, investor or supplier (Dunham, Freeman & Liedtka, 2006., Crane & Ruebottom, 2011) and the theory does not accommodate important categorisation such as demographics, cultural, political or social affiliations. According to Crane & Ruebottom (2011), its weaknesses are exhibited in its failure to identify and incorporate bonds of group cohesion and social identities. Social identity is a construct or definition of self, based on a “set of mutual understandings regarding unique characteristics that distinguish members from non-members” (Crane & Ruebottom, 2011., Rowley & Moldoveanu, 2003). They claim that the theory fails to refine stakeholder identification and classification to include social identities including different interests, ideologies, values and expectations.

Although these arguments and opposing views are recognised and acknowledged, this research found that the theory’s principles and frameworks for the identification and prioritisation of stakeholders were relevant to this study. The classification of stakeholders was relevant to this research because, firstly, it provided insight into who the Smart City agendas are designed to benefit and for what value, influence and relationships. This is important because this research was seeking understanding of for whom, why and how the agendas are developed. In addition, the researcher was able to identify key informants for primary data collection through this classification. Interview participants were mapped accordingly to the roles they play in the Smart City.

The next chapter provides the methodological design used in conducting this research.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

The aim of chapter three is to describe the research methodology and design that was used to conduct the study. The chapter commences by presenting the research philosophy that the study adopted, followed by a detailed discussion of the methodological design used to collect and analyse data commensurate with the philosophy adopted for the study.

3.1 RESEARCH PARADIGM

Gay and Airasian (2003) define research as a disciplined inquiry into the study of a problem; that is a systematic means of solving problems to discover truth and construct reality. All research work is associated with a philosophical perspective or research paradigm that is linked to the researcher's perception of what reality may be (Fellows & Lui, 2008). A research paradigm is a comprehensive belief system that guides research and practice in the field (Fellows & Lui, 2008). Chua (1986) states that a paradigm represents a world view that is grounded in a set of assumptions, which influences the choice of problem and choice of methods through which the study is conducted. All research is based on some underlying assumption about what constitutes valid research and which research methods are appropriate (Myers, 1997). To Myers (1997), the most relevant assumptions are those that relate to the underlying epistemology. Epistemology is a branch of philosophy that deals with what constitutes acceptable knowledge in a field of study and how it can be obtained (Saunders, Lewis & Thornhill, 2009).

This research follows the paradigm classification of Chua (1986) as adopted by Orlikowski and Baroudi (1991). These paradigms are positivism, interpretivism and critical realism. According to Orlikowski and Baroudi (1991), positivism aims to test theory for predictive understanding of phenomena and utilizes structured instruments to investigate relationships within phenomena. Interpretive research aims to understand phenomena through the meanings that people assign to them, based on the assumption that access to reality is only through social constructions such as language, consciousness and shared meanings (Myers, 1997). In this paradigm, truth and reality are socially constructed and do not exist independently (Fellows & Lui, 2008). Information systems research can be classified as interpretive if it is

assumed that our knowledge of reality is gained only through social constructs such as language, consciousness, shared meanings, documents, tools and other artifacts (Klein & Myers, 1999). Interpretive research does not predefine dependent and independent variables, its focus is on the complexity of human sense-making as situations emerge (Kaplan & Maxwell, 1994).

Critical realism has similarities to interpretivism (Klein & Myers, 1999). Critical researchers assume that social reality is historically created, produced and reproduced by humans (Klein & Myers, 1999). The critical paradigm advocates that there are objective aspects that influence our perceptions. These are political, economic and cultural powers and the analysis of these is perceived as important to provide justifiable ways for considering ontological assumptions of the world (Oates, 2006). The unique feature of the critical paradigm is the particular attention to evaluation, that is, reality is scrutinised with the objective of evaluation and exposure of discrepancies and conflicts (Orlikowski & Baroudi, 1991).

Lawler, Mohman, Lefdord and Cumming (1985) suggest that research must be approached using a method relevant to the area under investigation, considering for example, whether research aims to be inductive or deductive.

A research method is a strategy of inquiry which originates from the philosophical assumptions that inform research design and data collection (Myers, 1997). Qualitative research involves the use of a range of techniques to collect data including interviews, observational techniques such as participant observation and fieldwork, archival research of written data sources such as published and unpublished documents, company memos, letters, reports, and newspaper articles (Myers, 1997).

In light of this, this research adopted the interpretive paradigm with an inductive approach. The choice of paradigm was informed by the objectives and context of the study which was addressing the 'why and how' question. Interpretive studies try to identify, explore and explain how factors in a particular social setting are related and interdependent (Oates, 2006).

Within the broader context of the interpretive paradigm, this study undertook an exploratory approach. Exploratory research is conducted to address a research problem when there are few or no earlier studies to refer to (Eugene & Lynn, 2017). The focus is on gaining insight and familiarity for later investigation or when a problem is in a preliminary stage (Eugene & Lynn, 2017). In qualitative research, an exploratory approach is appropriate for a study where there is limited prior research in a particular field, more so, for its flexibility and its ability to address questions of why, how and what.

The benefits of the qualitative approach are that it is flexible and can be tailored to the needs of the exploration using open-ended approaches (Myers, 1997). For this particular study, this approach was chosen for the ability to provide a better understanding of stakeholders' perceptions, objectives, priorities, conditions and processes that may, or may not, affect Smart City agendas within the African context.

In light of this, the study undertook to explore how African cities are adopting Smart City agendas. The aim was to unpack what the objectives are, uncover the priorities and anticipated benefits for adopting Smart City agendas, as well as determine the approaches used in adopting these agendas. In unpacking these questions, this study was seeking human understanding of Smart Cities, city priorities and processes, and in doing so, it was important to take context into account, making interpretivism the appropriate research paradigm, as interpretive research in Information Systems is concerned with understanding the social context of an information system (Oates, 2006).

This study was about cities, and the social process by which the concept of a Smart City is developed and constructed is influenced by its social setting i.e people, organisations and institutions (Oates,2006). Therefore, an exploratory approach to the research process was appropriate given the fact that the Smart Cities concept is new within the African context that is, in its design and application, which places a limitation on the amount of literature or prior research available in the Smart Cities field within the African context.

3.2 CASE STUDY DESIGN

A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, and is most appropriate when the boundaries between phenomenon and context are not clearly evident (Yin, 1994). An in-depth definition of a case study is provided by Simons as:

“the exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, programme or system in a real-life context. It is research-based, inclusive of different methods and is evidence-led. The primary purpose is to generate in-depth understanding of a specific topic, programme, policy, institution or system to generate knowledge and/or inform policy development, professional practice and civil or community action” (2009, p. 44).

Case study research is usually conducted in the interpretive tradition and relies mainly on the collection of qualitative data, which allows for the description of an intervention and the real-life context in which it occurs, as well as illustrating or describing topics within an exploratory study (Yin, 1994). This study seeks to understand ‘how’ African cities are adopting Smart City agendas, establish what the objectives of these agendas are and the approaches adopted in setting the Smart City agendas. These questions can only be answered through understanding the context of the cities.

The field of information systems is characterised by constant technological changes. As a result, new concepts or topics emerge each year for which valuable insight can be gained through the use of case research (Benbasat, Goldstein & Mead, 1987). Below are three reasons provided by Benbasat et al. (1987) why a case study strategy method is a feasible option for information systems research:

- i. The case method allows the researcher to answer ‘how’ and ‘why’ questions, that is, to understand the nature and complexity of the processes taking place. This research seeks to answer questions of ‘how’ a particular concept is being adopted within the African context.

- ii. The researcher can study information systems in a natural setting, learn about the state of the art, and generate theories from practice. This research can only be carried out in the cities and the setting of the government agencies involved in Smart City projects.
- iii. A case method is an appropriate way to research an area in which few previous studies have been carried out. The Smart Cities field currently does not have existing theories about Smart City project adoption or setting to test, and work in the area remains exploratory.

As a result, this study made use of a case approach as the nature of the questions that this research explored could be best understood and answered using a case strategy. This is because a case approach focuses attention on a particular instance of social phenomenon, such as a village, a community or a family (Babbie, 2011). The focus for this study was on two specific cities in Africa. These were explored as case examples for the purpose of understanding why and how Smart City agendas are being adopted in Africa.

The complex nature of the topic, as well as the different contexts in which the research questions were explored, also influenced the choice of strategy. Orlikowski and Baroudi (1991) argue that interpretive research is useful for studying social process and is designed to investigate complex, dynamic, social phenomenon that are both context and time dependent. Yin (1994) argues that a case study technique allows for the explanation of the casual links in real-life interventions that are rather too complex to understand using surveys or experimental techniques.

3.3 CITIES SELECTED: BASIS FOR CASE SELECTION

The study was conducted using comparative case studies of two purposely selected African cities: Cape Town in South Africa and Nairobi in Kenya. A comparative study was chosen for the following reasons:

- To identify the contextual factors that influence the adoption of Smart City agendas in Africa
- To detect commonalities and differences in the patterns of Smart City adoption and implementation across African cities

The two cases were chosen based on the following: (i) Cities that have an explicit Smart City agenda (that is, information about this agenda is available); (ii) Cities that are comparable in size, economic activity plus influence, and (iii) Cities to which the researcher had access. Table 4 below presents in detail facts about the cities selected as case sites.

Table 4 : Cape Town and Nairobi City facts

City	City Details	Smart City Initiatives
Cape Town (South Africa)	Population: 3.7 million Size: 2 461 square km GDP: US \$56.8 billion Legislative capital of South Africa Main economic activities include: Finance, insurance, property and business services Manufacturing Tourism	<ul style="list-style-type: none"> • Energy • Water • Infrastructure • Public Safety • Waste Management • Environment - Biodiversity • Access to information and communication technologies <p><i>Sources: Cape Town Integrated Development Plan (IDP) 2012-1017</i></p>
Nairobi (Kenya)	Population: 3.5 million Size: 696 square km GDP: US \$12 billion Capital city of Kenya Nairobi is the major business hub of Kenya and the East African region, Main economic activities include: Manufacturing Tourism Headquarters to several international companies and organizations	<ul style="list-style-type: none"> • Energy • Infrastructure • Environment • Trafficking system • Waste management • Disaster Management • ICT <p><i>Sources: (NIUPLAN 2014-2030)</i> <i>IBM's white paper "A vision of a smarter city"</i></p>

3.4 DATA COLLECTION

This study made use of primary and secondary data sources. Primary data was collected through interviews with the various city stakeholders, while secondary data was collected from documents covering Smart City agendas such as policies, plans and city-wide strategy plans. The following procedures, methods and sources were applied in collecting, validating and ensuring that reliable data was collected.

3.4.1 Documentary evidence

A systematic document review was conducted to examine material relevant to the research questions of the study. The review examined research in a range of disciplines such as urban studies, e-government, public administration, social sciences and information systems. This information was collated and integrated with data that was obtained through primary data collection. The processes, sources and types of documents included in the search and collection are presented in the following sections.

3.4.2 Document search procedure

A systematic document review to examine supporting evidence addressing the purpose and objectives of this study was conducted. The purpose of the review was to examine secondary data sources that address (i) what motivates African cities to adopt Smart City agendas (ii) the objectives, e.g. priorities, anticipated benefits and the beneficiaries for Smart City agendas, and (iii) the models or approaches adopted in implementing/setting Smart City agendas.

The search was tailored to source documents through an automated search of multiple databases and portals for possible inclusion in the study. The databases were selected because they contain information on peer-reviewed journal articles, practitioner and policy documents and media reports. According to Ng & Peh (2010), article selection is a method used to select relevant articles for a systematic review.

3.4.2.1 Selection criteria

Table 5 shows data sources, justification for selection and categories of documents.

Table 5 : Research data sources and types of documents

Source for data collection	Justification for choice of selection	Categories of documents
<i>Association for Computing Machinery</i>	A premier source of IT-related publications and contains an update of the latest conference proceedings, case studies and book chapters	Academic articles Practitioner articles
<i>African portal</i>	Covers material specific to the African context both academic and non-	Academic articles Practitioner articles

	academic	
<i>EBSCO host</i>	Provides a wide range of both academic and business-related reference material including e-government, urban environment and business	Academic articles Practitioner articles
<i>Science Direct</i>	A premier source of high-quality academic science papers	Academic articles
<i>Municipal websites of the two cities</i>	Source for municipal city plans specifying Smart City agendas, city policies etc	Plans from cities Policy documents
<i>Media agencies</i>	BBC Africa and All Africa News for their extensive coverage of African news and beyond; these were sources for press reports	News reports

3.4.2.2 Search criteria for inclusion and exclusion

The search and screening process of relevant articles involves the searching criteria for documents and criteria for inclusion and exclusion. This process helped identify articles that contributed towards answering the research questions. The search terms for the study were based on the research questions and key words such as ‘Smart City’ ‘Smart Cities in Africa’ ‘Smart City agendas’ ‘Smart City + Nairobi’ ‘Smart City + Cape Town’. The inclusion criteria for the study included:

- Documents published in the last 16 years January 2001 to July 2017;
- Articles written in English;
- Themes that addressed Smart City agendas or had been adopted in Africa;
- News articles about Smart Cities in African cities.

The exclusion criteria for the study included:

- Articles that did not relate to the research questions;
- Articles that had been published before December 2000.

3.4.3 Interviews

In this study, the researcher interviewed stakeholders in each of the two cities. An interview schedule was used to conduct semi-structured, face-to-face interviews with those identified as stakeholders on the Smart City initiatives. Semi-structured interviewing is a commonly used method in qualitative research and according to Dawson (2002), this type of interview is used when the researcher wants to obtain specific information which can be compared and contrasted with information gained from other interviews or sources. These were conducted with participants using Rubin and Rubin's (1995) approach. Their model of qualitative interviewing emphasizes active participation of the interviewees. The interview schedule contained a list of open-ended questions and sub-questions which had been developed prior to the interview (Appendix A). Questions were derived partly from literature, from stakeholder theory and some were drawn from similar cases of Smart City agendas in other regions. The interview questions were structured to align with research questions and had a different protocol for each type of stakeholder, as identified in Appendix A. Interviews were digitally recorded and informed consent was obtained from each participant beforehand. The duration of interviews ranged between forty-five (45) minutes to an hour (1) in length with participants.

3.4.4 Interview participants

Participants targeted for the interviews were from a variety of stakeholders involved in the Smart City initiatives in Cape Town and Nairobi. The aim was to interview stakeholders based on the types. The participants were drawn from the categorisation provided by Clarkson (1995) of stakeholders as primary (those whose views have a major impact on the survival of a project) and secondary (those who influence or are influenced by the organisation and essential to the survival of a project) stakeholders. This categorisation is further divided into three types as responsible, impacted and interested stakeholders (El-Gohary et al., 2006) as represented by Mitchell et al. (1997) to be stakeholder attributes of power, legitimacy and urgency.

This research applied purposeful sampling in the selection of the cities for this study and those interviewed for the study according to the classification of responsible, impacted and interested stakeholders. However, the sampling method for interview participants was combined with snowball sampling which was used as a technique to access interview participants. Snowballing is a form of opportunity sampling in which one informant is asked to name others whom the researcher could approach (Knight, 2002). This technique was chosen because the study was exploratory in nature.

Table 6 provides the categories, types of stakeholders and those that were identified as potentially involved in the Smart City initiatives for interviews. The number and category of the interviews will be detailed in section 3.6 on page 48.

Table 6 : Categorisation and types of stakeholders identified for interviews

Types of stakeholders	Examples of Smart City Stakeholders	Target for interviews
Responsible	Government, businesses, investors, developers, IT companies, architects	At least 3 from this category
Impacted	Citizens/residents, businesses, environmentalists	At least 2 from this category
Interested	NGOs, schools, clubs, research institutions, think-tanks, aid organisations, clubs, media	At least 1 from this category

Primary data collected from interviews was in the form of audio recordings which was transcribed. Transcription is an interpretive research procedure that involves turning raw data (audio, video, field notes, documents) into written text form so that they can be studied in detail and then linked with analytical notes or coded (Baily, 2008). Data collected for this study was collected in audio format. I then transcribed each interview recording to text form for analysis and interpretation. The transcription process was manually performed on an electronic text processor Microsoft Word.

3.5 DATA ANALYSIS AND INTERPRETATION

Qualitative data analysis typically falls into one of two categories, content and thematic analysis. Content analysis focuses on evaluating the frequency and salience of particular words or phrases in a body of original text data in order to identify key words or repeated ideas (Guest & Macqueen, 2008). Codes developed for themes are applied or linked to raw data as markers for analysis. According to Guest and Macqueen (2008), this includes comparing the relative frequencies of themes or topics within a data set, looking for code co-occurrence or code relationships.

Thematic analysis focuses on identifying and describing both implicit and explicit ideas and themes (Guest & Macqueen, 2008). Thematic analysis is a method for identifying, analysing and reporting patterns within data (Braun & Clarke, 2006). According to Dey (1993), thematic analysis can be expanded to include associated attributes of keywords and other semantic elements, such as synonyms and surrounding words or phrases. For the purposes of this study, thematic analysis was used to identify emerging trends and themes in the adoption and development of Smart City agendas.

Primary and secondary data was analysed using a coding technique, which is 'a process of classifying and categorizing text data segments into themes or concepts which can be used to uncover patterns in data' (Bhattacharjee, 2012, p. 119). The researcher used thematic analysis to identify which themes occur, in which context, and the relationships between the themes as they reflect back on the research questions for the study and how they tie into the literature. Oates (2006), states that data analysis involves a constant comparative method for each new code, category or concept as identified in the data. In this study, a practical manual process was applied to the data using codes as part of the analysis process. Coding is described by Bryman & Burgess (2002) as a process of categorising and sorting data, while codes serve to summarise, synthesise and sort observations made out of the data. In addition, coding acts as a link between data and the conceptualisation (Bryman & Burgess, 2002). The method entails a comparison of primary and secondary data for patterns, concepts and themes. Pre-set themes were drawn from the review of

existing literature, case examples and existing frameworks. Appendix C details the set of prior themes drawn from literature that were used.

Two steps were followed in the analysis of primary data. The first step involved reading of the interview transcripts by the primary researcher. The close reading was to give the researcher an initial idea of general themes and concepts emerging from the data and how they relate or tie back to the literature. The initial reading of primary data made the researcher understand fragments of data in context, which is central to qualitative data analysis (Miles & Huberman, 1994). Miles & Huberman (1994), recommend that transcripts be read 'for regularly occurring phrases, and with an eye to surprising or counterintuitive material' (1994, p. 58). Based on this recommendation, the researcher read the interview transcripts more than once.

The second analytical step after reading the transcripts was coding. Coding is the process of assigning unique labels to text passages that contain references to particular categories of information (Miles & Huberman, 1994). Codes were assigned to each text group. Codes are partly analytical as they link various segments of text to a particular concept or theme (de Wet & Erasmus, 2005). This process of naming and classifying data results in a working set of codes. At this level, codes are descriptive but Miles & Huberman (1994) suggest they can also be interpretive.

Below is an example of a piece of text from interview scripts and the codes assigned for analysis purposes. The theme under which this text was grouped is stakeholder types (Stk), however, subcategories for types of engagement (Eng) and types of partnerships (Par) also existed within the same piece of text:

What I mean now is business inside, initiates projects but engages with business outside all the time in terms of what is needed to overcome the challenges. So interaction between our business and business outside is very close and continues and our projects initiated by our organizations and business units. People outside there say we need this, how do we enable that, how do we bold that. All three universities have been involved at different points in time we've had relationships with different universities but it tapers off very quickly because they/their stakeholders they can't offer such expert advice to try and influence our strategy and our investment and until recently

Stk-responsible
Stk-type
Par- experts
Par-business
Eng-methods
Eng-Challenges

there hasn't been much investment to make in those areas (R7CT-Government).

The source of quotations from the data is referenced as follows:

R – Respondent

1 – Respondent number assigned to maintain anonymity.

CT/N – city in which the respondent is represented (Cape Town or Nairobi).

So, R1CT is respondent 1 from Cape Town and R13N is respondent 13 from Nairobi.

The next section details the process used during data collection, where data was collected and which categories of stakeholders were identified and interviewed.

3.6 DATA COLLECTION: GAINING ACCESS FOR PRIMARY DATA

Data collection for this study began with a systematic search for contacts in the organisations currently tasked with setting Smart City agendas. Initially, two African cities outside of South Africa were purposely selected as case studies; these were Kigali (Rwanda) and Nairobi (Kenya). The selection was based on these cities having an explicit Smart City agenda (that is, information about the agenda is available), and being comparable in size, economic activity plus influence as well as their accessibility.

For Kigali (Rwanda), the first touch-points were visiting the established municipal websites on which information about the current Smart City agendas has been made available. In addition, searches through local online media reports were also conducted. In reading media reports, information such as generic emails and telephone contacts for the two cities were obtained. Initial attempts were made to contact people by calls and emails but no responses were received. Eventually, the city selection was changed because no contact could be made. A decision was taken to use Cape Town (South Africa) based on the factors stated above.

Initial contact with the city of Cape Town stakeholders was made with an official at a Smarter Cities symposium in Johannesburg and through prior acquaintances with the City of Cape Town. Permission for interviews was sought and granted in January 2016.

In the case of Nairobi, the same process was applied in the search for contacts. The Smart Cities projects are officially publicised in Kenya through various channels

including: newspaper articles, academic papers, project websites, online videos, IBM, BBC, video clips and YouTube. I frequently came across the name of the former Permanent Secretary of the Ministry of Information and Communications of Kenya, Professor Bitange Ndemo. His name was mentioned synonymously with the Konza Technology City project in Nairobi City County.

The researcher searched for his contacts online and found his Facebook account then crafted an email with all the details about the research and sent it to him during May 2015. He responded immediately and positively. Professor Ndemo put the researcher in contact with the team working on the Konza Technology City project in Nairobi. Many emails were sent through to the team. In most cases, those that I tried to contact were either on leave or attending a conference and could not respond to emails. I followed up on all my emails with phone calls, but this proved unsuccessful because most calls were not picked up or returned. However, with much persistence and patience, permission was eventually granted in March 2016 by the Konza Technopolis Authority in partnership with the University of Nairobi.

The first data collection trip was conducted in Cape Town in February 2016 over a period of five days. The trip was short and structured, this was partly because, before leaving for Cape Town, eight interviews had been diarised and I managed to secure an extra four while on site. At least three interviews were conducted per day with the various stakeholders involved in the Smart City initiatives of the city of Cape Town.

Data collection in Nairobi was conducted in April 2016 over a period of 14 days. The collection process was less structured than that of Cape Town. The pace started out a little slower, the first few days involved orienting myself to the city, sorting out technical matters (buying a SIM card, registering on the local network, and finding the right power adaptors which took two days). It also included learning how to navigate the local transportation networks and routes, finding suitable accommodation and restaurants, local supermarkets, as well as learning basic words in the commonly spoken local language of Swahili. Although Kenya's official language is English, local languages are still widely spoken. Navigation around the city was made easier by the assistance of a student guide.

A total of eleven (11) interviews were conducted within and around Nairobi with stakeholders identified for the research. The first set of interviews was conducted in Machakos, specifically in an area called Konza. Konza is situated 60 kilometres outside Nairobi, earmarked to be a new Smart City by the government of Kenya and being built from scratch and locally referred to as 'Konza Technology City'. Back in Nairobi, some of the interviews were conducted at the Konza administrative offices. The Konza project office (KotDA) was established to oversee the implementation of the Konza Technology project tasked with managing the new Smart City project. I was not able to pre-schedule interviews and, on the advice of researchers who had previously collected data in Nairobi, I set out without any fixed arrangement. Overall, data collection in Nairobi took on an unstructured approach, partly because of the nature of the research being exploratory that snowballed from informant to informant.

Table 7 is a representation of the type(s) and number of stakeholders interviewed in each city. The initial target for respondents was to interview at least a minimum of six (6) within the categories of Responsible, Impacted and Interested stakeholders and a maximum of ten (10) for each city. However, due to the snowballing technique employed for data collection, the number of interviewees increased, particularly in the categories of responsible and impacted stakeholders, as they were more easily accessible.

Table 7: Types and number of stakeholders interviewed in each city

Types of stakeholders	Examples of Smart City stakeholders	Obtained - Cape Town	Obtained - Nairobi
Responsible	Government, businesses, investors, developers, IT companies, architects	Government (10)	Government (4)
Impacted	Citizens/residents, businesses, environmentalists	Citizens (1) Business (1)	Government (3) Citizens (3) Business (1)

Interested	NGOs, schools, clubs, research institutions, think-tanks, aid organisations, clubs, media		School (1) Research institution (3)
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3.7 VALIDITY AND RELIABILITY

In qualitative research, validity refers to the process employed by the researcher to check for accuracy of the findings. It is defined as ‘the extent to which an account accurately represents the social phenomena to which it refers’” (Hammersley, 1990 in Silverman 2001, p. 57). Reliability is the degree of consistency with which instances are assigned to the same category by the observer on different occasions (Silverman, 2001). A study in quantitative or qualitative fields is required to meet trustworthiness criteria linked to the quality of the findings (Anney, 2014). Trustworthiness is a methodological evaluation criteria employed in research design, data gathering and data analysis, intended to enhance accuracy and adequacy of the study inquiry (Anney, 2014). In interpretive research, validity and reliability are linked to evaluation of the research process as well as the criteria used to determine or validate the quality of the findings (Oates, 2006). These are internal and external processes employed to ensure the research and its findings can be checked against the following criteria used in qualitative research: confirmability, dependability, credibility and transferability (Lincoln & Guba, 1985). This is how this study applied these criteria to ensure that the research is consistent with the trustworthiness criterion and checked against confirmability, dependability, credibility and transferability.

According to Lincoln & Guba (1985), confirmability refers to the practice of a second researcher assessing and following an audit trail of the raw data, the summaries of it and the analysis produced. This research study made use of a second researcher in the form of a supervisor who checked a trail of the data gathered from primary and secondary sources to confirm the data gathering and the analysis processes.

Dependability refers to “the stability of findings over time” (Bitsch, 2005. P 86). The emphasis with dependability is on inquiry audit as a measure which enhances the findings. Inquiry audit is used to examine both the process and the product of the research for consistency (Golafshani, 2003) This process is established using

strategies such as audit trail, code-recode, stepwise replication and peer examination (Anney, 2014). This research applied the code-recode strategy. Code-recode strategy involves the researcher coding the same data twice by giving at least one or two weeks' period between each coding session (Anney, 2014). This process assisted the researcher to identify and understand patterns from data and clarify narratives that were not understood in the first coding session.

Another criterion applied was credibility. Credibility is the process by which the subject of inquiry is accurately identified and described so that the research findings are credible (Lincoln & Guba, 1985,). Using the credibility criterion, the study made use of data triangulation. Triangulation is the use of more than one source of data or approach to the investigation of a research question, in order to enhance confidence in the results or findings (Bryman, 2003). Creswell & Miller (2000) state that "triangulation is a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study" (2000, p. 126). Data triangulation was achieved by engaging multiple data collection methods such as interviews, recordings and written data sources related to Smart City adoption and implementation. In addition, case references to other Smart City initiatives were identified in the literature to inform and enhance understanding of the practical and theoretical findings in relation to the objectives of the study.

Transferability is the degree to which the results of a study can be transferred to other context or settings with other respondents (Anney, 2014). According to Bitsch (2005), this can be achieved through thick description and purposeful sampling. Purposive sampling is defined as a technique used in selecting units e.g. individuals, groups of individuals or institutions based on specific purposes associated with answering a research question (Anney, 2014).

3.8 ETHICAL CONSIDERATIONS

Research should always be conducted in an ethical manner to ensure that participants do not incur harm during the research process (Bailey, 1994). Conforming to ethical standards ensures that participants are not subject to harm or that their well-being is compromised.

This study adhered to the University of the Witwatersrand's ethical principles stipulated by the ethics committee. Permission was sought from each participant before the interview by the use of a participation letter and formal written consent. This study also conformed to the following ethical standards as identified by Bhattacharjee (2012):

- Voluntary participation and harmlessness: Respondents were made aware that their participation in the study was voluntary, and that they could withdraw at any time without any unfavourable consequences. Respondents' participation or non-participation would not subject them to any harm.
- Anonymity and confidentiality: To protect respondents' interest and future well-being, no personal identity (e.g. name, ID or cell number) was required. The non-identity would be ensured using the principles of anonymity and confidentiality. However, it is important to note that Professor Bitange Ndemo gave permission to use his name explicitly for the purposes of this research.
- Only adults were included who are not in a vulnerable position.
- In addition to the above standards, the researcher also observed the disclosure standard. The researcher provided information about the study to respondents before data collection to help them decide whether or not they wished to participate. The researcher indicated willingness to share with respondents and stakeholders the analysis outcomes by sending them a copy of the transcript for comments. However, because of political interest, the stakeholders may not agree with the outcomes of the study.

3.9 LIMITATIONS OF STUDY

This study focused primarily on the two African cities of Cape Town and Nairobi. Because Smart City agendas are relatively new in Africa, only a few countries on the continent are reported to have adopted them. However, of these, most are either at planning or strategy formulation stage (Watson, 2014). For the purposes of this study, only two cities were used as cases. As a result, findings are not easy to replicate elsewhere even among countries with a similar socio-economic context. The engagement timeframe with the stakeholders posed as a limitation, including the number of stakeholders that were involved during the data collection process. Despite these limitations, this study is a step towards understanding and

documenting Smart City initiatives in Africa, as well as exploring the applicability of stakeholder theory in the adoption of Smart City agendas in the African context.

CHAPTER FOUR: WHY AFRICAN CITIES ARE ADOPTING SMART CITY AGENDAS

4.1 INTRODUCTION

The aim of this study was to explore why and how African cities are adopting Smart City agendas. This chapter presents data findings and discusses the first sub-question of this research, namely the reason why African cities are adopting Smart City agendas. The chapter begins by providing the local context of the two cities and a detailed analysis of why they adopted Smart City agendas. Further, although literature was reviewed generally in chapter two of the study, additional literature has been referenced in the sections that follow to set the context of each city's background and to reflect on agenda issues that emerged from the data.

In recent years, a number of African cities are reported to have a draft proposal or to have implemented Smart City plans as part of their development agenda. An extensive review of past research of primary and secondary sources suggests that the reasons for pursuing Smart City agendas can be broadly categorised into social, economic, environmental and political factors, although some reasons are specific to the contextual conditions of the city (United Nations, 2014). In this study, I found that the reasons why African cities are adopting Smart City agendas fall into these categories and specific themes emerged in each category as follows: Social (rapid urbanisation, safety and security, and social inclusion); economic (competitive global economic and financial environments); environmental (deteriorating natural resource base and natural disasters) and infrastructure development. In addition, while the political factors are certainly there, political issues are more around governance and the data did not reflect on the governance issues in detail. Furthermore, the political factors were a relatively minor part of the study and could not be addressed within the constraints of the case study format.

4.2 CASE OF CAPE TOWN AND NAIROBI

4.2.1 Background context: Cape Town

Cape Town is a port city on South Africa's southwest coast. It is the capital of the Western Cape Province and one of the largest cities in the country. As the second most-populated city in South Africa, the population is estimated to be approximately 3.7 million. The city occupies an area of 2461 km² (Statistics South Africa, 2016). Sixty-four percent of the population of the Western Cape Province resides in the city of Cape Town. Politically, Cape Town is South Africa's legislative capital where the parliamentary chamber of the country is located. Economically, Cape Town is the hub of the Western Cape Province and the second main economic centre for South Africa after Johannesburg. Cape Town has a diversified economy with major business activities which include: finance, insurance, property, tourism, manufacturing, wholesale, retail trade, entertainment and technology. The city contributes about 11% to South Africa's GDP and 71% to the Western Cape's economic activity (Cape Town Digital Strategy, 2015; Statistics South Africa, 2016).

The city is managed and governed by the City of Cape Town City Council, a centralised municipality for the Western Cape established in the early 2000s. In the 1990s and the early 2000s Cape Town, like all other South African cities, found itself on the brink of structural changes politically, economically, socially as well as technologically. In 2001, legislation was enacted to force what were then seven independent municipalities in the Cape Metropolitan area into one Unicity council, the City of Cape Town.

This was part of the transformation that South Africa was undergoing as a country following the change of government in 1994. In the previous government, city structures and operations were designed according to the apartheid racial classifications. In the year 2000, the city leadership recognised the need for transformational solutions to assist Cape Town deal with its unique historical challenges as well as a strong desire for a better future for Cape Town as a city. In part, the city initiated a Smart City agenda, whose goal was to capitalise on the opportunities presented by technology, as a stepping stone to drive change and transformation.

Cape Town's digital strategy (2015) documented the following areas in which projects were selected to respond to specific contextual challenges and opportunities. These were prioritised on the agenda to indicate which require the most attention in relation to the city's mission and vision. Although this list is not exhaustive, it includes the following:

- Service provision
- Connectedness
- Transportation
- E-government
- Safety and security
- Environment
- Technological infrastructure
- Resources and waste management.

The strategy was narrowed to four key pillars, namely: (i) leadership, (ii) policy and the regulatory environment, (iii) e-government, and (iv) city/people development. In each of these focus areas, key priority projects were formulated with the aim of repositioning Cape Town as a leading player in the new global knowledge economy. The desire was to change the way local government worked, interacted and delivered key services to residents, businesses, government agencies and all related stakeholders (City of Cape Town, 2002).

But, before the formal adoption of the strategy, the city formulated five key questions posed to help determine the solutions the city should pursue, as follows:

- i. What leadership is necessary to establish a globally competitive city in the knowledge economy?
- ii. What was to be done to ensure that policies and the regulatory environment support the development of a smart city?
- iii. How would ICT lay the foundation for building a flexible and responsive organisation and enable the organisation to continually improve in its efficiency and effectiveness in delivering its programmes and services?

- iv. How does the city use ICT as a stepping stone to foster economic and social development of the city?
- v. How can ICT be used to ensure/enhance good governance?

(City of Cape Town, 2002).

In this study, the data reveals that Cape Town faces similar problems to most cities in the world and in Africa. However, the list that follows is an indication of the specific challenges that have directed the city's efforts to strive towards a world-class globally competitive knowledge economy (City of Cape Town, 2002).

Problems included:

- City leadership not being IT savvy
- Citizens not technologically literate or connected
- Strong need for personal and organisational communication
- Disparate systems operating in silos affecting service delivery
- History of lack of transparency/suspicion of government
- Need to change citizens' attitudes towards local government
- Need to develop entrepreneurs and promote innovation.

The projects undertaken reflect these challenges. For example, an initiative such as issuing councillors with PCs or laptops was identified as fundamental to improve the ICT skills of leaders back in the early 2000s. The SmartCape access project was designed to provide citizens with free internet access and email accounts. This was established via local libraries as a way of exposing and providing ICT skills education and enabling a platform for communication with the aim of addressing the digital divide.

The Smart City agenda laid the foundation for significant investment in organisational ICT infrastructure for the benefit of the organisation and its residents. Examples include implementing the South African Police (SAP) enterprise resource planning (ERP) application to facilitate integrated and automated systems and new channels of service delivery.

It is not clear whether Cape Town managed to find answers or solutions to each of the questions posed to help formulate the strategy. But, based on the 15-year-long

Smart City agenda the city has pursued and the evidence from this study, one can conclude that the various initiatives seem to have been directed towards addressing each of the guiding questions. However, it is important to note that this research was not to evaluate the successes or progress of any of these initiatives. The aim was to establish why and how the city adopted a Smart City agenda. A detailed discussion of the contents of the agenda in line with the city's mission will be provided in chapter 5.

4.2.2 Background context: Nairobi

Nairobi is Kenya's capital city and the main economic, commercial, political and cultural centre for East Africa. It is located in the southern central part of Kenya and is the largest city in the East African region covering an area of 695,1 km². According to the Kenya population and housing census conducted in 2009, the population of Nairobi was 3.1 million but is estimated to have risen to approximately 3.5 million as of 2015 (Kenya Population and Housing, 2015). Economically, Nairobi is the major business hub of Kenya and the East African region. Its main economic activities include: agriculture, manufacturing, retail, tourism and professional business services such as finance. It is also the regional headquarters to several international institutions of global governance, for example the United Nations, World Bank, African Development Bank, International Finance Corporation and technology companies such as IBM.

Since 2010, much has been written and publicised about Nairobi's new development plans. These plans are not reflections of ordinary urban planning; they are grand, flamboyant and elaborate with an orientation towards and influence of urban planning of the global north (Watson, 2014). The Kenya Vision 2030 is the latest development document covering the period 2008 to 2030. It aims to transform Kenya into a newly industrialised 'middle-income' country providing a high quality life to all its citizens by 2030. In addition, the vision aims to have secure, well-governed, competitive and sustainable cities and urban areas that contribute to the achievement of the broader national development goals articulated in the Kenya Vision 2030.

In 2010, the Kenyan government at national and local level underwent some structural changes based on the new constitution enacted on the 27 August 2010.

The constitution introduced the concept of political, administrative and fiscal devolution centred on the geographical unit known as a county. Local government moved from a variety of structures such as city, municipality and town and were collapsed into what is now referred to as county government structures. In total, Kenya has 47 counties and Nairobi City was changed from the City Council of Nairobi to Nairobi County (Constitution of Kenya, 2010).

The changes to Kenya's political and administrative structures are attributed to the country's 2030 Vision. The vision contains within it an urban development master plan for the period 2014 to 2030, known as the Nairobi Integrated Urban Development Master Plan (NIUPLAN, 2014). This plan contains an agenda to transform the urban areas of Kenya, especially Nairobi County, into a world-class African Smart City. However, the specific objectives and aims are outlined in the National Urban Development Policy of 2012 (NUDP). The policy aims at strengthening development planning, urban governance and management, promoting urban investment and delivery of social and physical infrastructure in urban areas. At regional level, the Nairobi Metropolitan Region 2013–2030 (NMR) forms part of umbrella plans falling under the NIUPLAN (2014). The plan was formulated chiefly under the framework of the County Government Act with specifications of the Urban Areas and Cities Act, as the entire area of Nairobi County is considered urban.

The city of Nairobi documents a number of areas as having the most challenges according to the (NIUPLAN, 2014) and the IBM: A vision for a Smarter city report (2012). These areas address issues that are prevalent in many developing countries and are not unique to Nairobi. However, a few challenges are context specific due to Nairobi's strategic positioning politically, economically, socially and environmentally in the east African region. These are in the following areas: transportation, infrastructure, environment, urban economy and socio-cultural issues, governance and institutions and land use and human settlements. The IBM report (2012) documents the following as priority on the agenda: congestion, transportation, ICT integration and coordination, safety and security and utilities. In addition, the Nairobi Metropolitan Region 2030 also sets out key objectives aligned with the Smart City agenda. The Nairobi Metropolitan Region 2030 sets out the following vision and

guiding principles. The aim is to pursue a world class image for the Nairobi county region as articulated in the Kenya Vision 2030 in the following ways detailed in table 8:

Table 8: Nairobi Metropolitan Vision 2030 Objectives

Objectives	Key foundations
World-class working environment	Building an internationally competitive and inclusive economy for prosperity Delivering a unique image and identity through effective place branding
World-class living environment	Deploying world class infrastructure and utilities for the region Enhancing the quality of life and inclusiveness in the region Ensuring a safe and secure region
World class business environment	Optimizing mobility through effective transportation
World class metropolitan governance	Building a world class governance system

Source: Kenya Vision 2030

The rationale in the NMR 2030 strategy, and prior research conducted by IBM and others, indicate two things: firstly, that, Nairobi is over-congested. Secondly, the city’s infrastructure and current social and economic structures experience difficulty in managing current population demands in many areas of the city (IBM, 2012; Nairobi Metro 2030; Watson, 2014).

4.3 SOCIAL ISSUES

4.3.1 Rapid urbanisation

The effects of urbanisation on Cape Town and Nairobi where noted both from the review of literature as well as from primary data. The rate and scale of the increasing population in African cities has translated into a number of issues, namely: informal slum dwellings, increasing levels of urban poverty, rising inequality in terms of access to resources and many other social and economic ills. In addition, informality has placed increased demand on natural resources and the environment (African Development Bank, 2012). The sections that follow provide background information

on the effects of urbanisation, safety and security and issues of social inclusion (digital divide) for Cape Town and Nairobi.

4.3.2 Effects of urbanisation on Cape Town and Nairobi

For both Cape Town and Nairobi, the compounding effects of urbanisation and a rapidly growing population are manifest in the changing landscapes of human settlements, with significant implications for living conditions, service provision, environment and quality of life.

According to a report by Statistics South Africa (2016), the Western Cape Province, of which Cape Town is the major city, has received about 344,830 immigrants as opposed to 194,609 migrations out between the period 2011 to 2016. Considering 64% of the Western Cape population resides in Cape Town, provision of decent housing has been a challenge for the city (IDP, Mid-year review, 2014/2015). One of the city's challenges is to transform its spatial and social systems into more integrated and compact areas, with areas that bring residents closer to the city. In line with this, Cape Town understands that one of the ways of influencing a city's development is through a planning process that is anchored in a strong vision to achieve and counteract the negative effects and impacts of rapid urbanisation (IDP, 2014).

Cape Town's Smart City agenda makes no mention of housing and sanitation as part of the projects' prioritised but a respondent pointed out the ways in which urbanisation has affected the city:

Urbanization and its challenges are felt on various levels e.g. access to natural resources, water, electricity etc. So through Smart city initiatives we try and manage the demand of those resources, e.g. water as an example. How do we help manage the fact that we live in a water-scarce area? Well, through billing or tariffs that we have, to change behaviour to try and help people to use this water we build progressive billing systems so that the people who waste water should be penalized and change behaviour. Urbanization has brought about many such challenges. Other examples of urbanization are a need for communication. You would be surprised how many displaced or migrant people live in big cities are very dependent on

free facilities like the Smart Cape library access to actually communicate at home with loved ones (R1CT- Government).

Nairobi faces issues similar to those that most cities grapple with as a result of urbanisation. Being the economic hub of the region, it is only logical that people would migrate to the city in search of opportunities for education, employment, health services and better living conditions. A population of 3.5 million on an area of 624,1 km² is bound to manifest in congestion, informal settlements, a higher demand on natural resources and other city services. As respondent indicated that:

One other purpose of the city was to decongest Nairobi; everybody in Nairobi drives from some suburb to the city so we get clogged up (R14N- Government).

According to the NIUMPLAN (2014), these issues are currently causing negative impacts on social, economic and environmental activities of the city. Black and Veatch (2016) report that African cities are expanding rapidly thereby placing added pressure on the functionality of both planning and infrastructure. For example, the sprawling of informal settlements hampers the city's ability to render essential services and results in a deteriorating quality of life affecting a good percentage of the city's residents, especially those in low-income groups and the unemployed. A respondent echoed this who said "The global trend in urbanization in which Kenya is not isolated from most of our population is moving towards urban centres, and the current urban centres are finding it a challenge to accommodate its people" (R22N - University).

When comparing the effects of urbanisation on these two cities, the population of Nairobi is estimated to be 3.5 million, close to that of Cape Town which is 3.7 million but in geographical size the two cities stand in stark difference. The geographical size of Nairobi is 695,1 km² while Cape Town is 2461 km². Nairobi accommodates almost the same-size population on an area that is three times smaller than Cape Town. This gives Nairobi the unique challenges of dense urban slums, issues with transportation and traffic congestion, higher demands on natural resources such as water, power and land, infrastructure shortage and environmental degradation.

Solutions designed to address the negative effects of urbanisation for the two cities are not the same. Nairobi is pursuing projects designed to redirect populations away from the major city by promoting new urban development projects in the form of new towns. Nairobi's current development master plan has earmarked six new towns within the Nairobi Metropolitan Region (NMR 2030), one of which is Konza Technology City. Comparatively, Cape Town does not have any immediate plans on the agenda directed at decongestion. This could be because there is no immediate need considering that the city of Cape Town stretches over an area of 2461 km².

The roles which stakeholders in Cape Town and Nairobi play are different. International companies in Nairobi seem to have a powerful influence in the development of the agenda. This may be linked to financial investments made towards the agenda and these dynamics point to the attributes of power and legitimacy of the stakeholders. However, in Nairobi, there also appears to be a sense of urgency towards the building of satellite towns as part of decongesting the over populated city, an agenda that benefits residents, local businesses and government. Cape Town's agenda points to a greater role the city government has and the needs which appear to be more urgent and legitimate for the city are social inclusion and mitigating the effects of the digital divide. Their programs have a particular focus on the need for an inclusive society giving preference to residents first and then to others like visitors, tourists, businesses and government. The need for social inclusion is considered urgent and legitimate in the South African context.

As the dynamics in social demographics and technological advancements in Cape Town and Nairobi continue to evolve, this study found that there are concerns over the safety and security of the cities due to rising crime levels, violence, and terrorism. The section that follows discusses this issue in greater detail.

4.3.3 Safety and security

Cape Town and Nairobi suffer from multiple social inequalities linked to public security. The city of Cape Town's social development policy (2013) discusses issues of safety and security in the city. High levels of drug related crime, violence, armed civilians and anti-social behaviour affecting communities and residents have been observed in both Cape Town and Nairobi.

In these two cities, there are three problem areas where issues of safety and security are of concern. These issues are: crime and violence, terrorism, and natural disasters. Heightened records of crime in Cape Town are linked to substance abuse, especially so in economically depressed communities such as the Cape Flats. In South Africa, Cape Town still ranks as one of the most racially segregated cities because of the apartheid spatial planning system which designed low-cost housing on the outskirts of society based on racial lines (Lester, 2014).

Similarly, the Kenya Police Services (KPS) annual crime report of 2014 and 2016, records that the trend of crime and insecurity in Kenya is caused by terrorism, the proliferation of small arms and weapons, inequity of resources, organised crimes, drug and substance abuse, community boundary disputes, sophistication of technology and politics driven by ethnic rivalry. According to the report, a county crime analysis indicates that the Nairobi county region is the most crime-prevalent county in the country (KPS, 2014).

Besides crime and violence, new and pervasive risks affecting cities include terrorism, urban warfare, heightened securitization and disease. Perhaps one of the problems that Cape Town does not seem to have is terrorism. Terrorism dominates in Kenya and KPS (2014) reports that Kenya has experienced 35 terrorist attacks since 1975, of which 26 took place in urban areas and Nairobi being hit the most. The impact of terrorism on cities has far-reaching effects and extends beyond civilian casualties to the destruction of infrastructure, buildings and a sense of social security (UN-Report, 2016).

While collecting data in Nairobi, the researcher observed that almost all shopping areas such as malls, supermarkets and crowded public places have a heavy police presence, and most streets are fitted with CCTV surveillance cameras and other sophisticated security technology. The tight security measures and the physical and technological alertness in Nairobi are linked to concerns over the safety and security of the city, both as a major economic centre and a tourist destination. Concerns about safety and security were expressed by some of the respondents in Nairobi:

Smart city solutions which are being implemented i.e. surveillance to support the security of Nairobi city implemented by the government

include cameras and other tools to aid security (R14N - Government).

The Institute for Security Studies (ISS) East Africa report (Atta-Asamoah,2015) suggests that the increase in terrorist attacks in Kenya has had enormous political and socioeconomic effects on the country. These incidents have eroded investor confidence, affected the tourism industry and heightened the perception of threat among citizens (ISS, 2015).

The ways in which Cape Town and Nairobi are responding to issues of safety and security have similarities and differences. The similarities are in how technology is incorporated as part of the solutions to the issues of crime, violence and terrorism. The differences are reflected in how and who is driving the agenda as part of the response strategy.

The city of Cape Town has developed a strategic pillar referred to as the 'Safe City', and focuses on making Cape Town a safe city for residents, tourists, visitors and the city itself. Safety and security are broad issues that go beyond policing, the goal of this pillar is to manage disasters and risks, enforce traffic regulations and provide fire and rescue services to promote the principle of a safe city. In addition, another solution designed by the City of Cape Town is an internal project called EPIC (Emergency and Policing Control System). The project consists of an integrated system to manage policing and emergency responses in a highly coordinated fashion enabled by the Safety and Security Directorate. The directorate manages policing and crime prevention and comprises the Metropolitan Police Department, law enforcement and specialised services, traffic services, fire and rescue service, the Disaster Risk Management Centre and the Public Emergency Communications Centre (World Design Capital, 2014).

According to the City, this approach to crime reduction and resources management through specialised systems uses geographic information systems (GIS) to map crime and other incidents and identify problems. The aim of such a sophisticated system is to ensure that information about the city is integrated and monitored for efficient services. The system includes automated data capture for statistical and real-time reporting as part of a well-run administration. The initiative is one of the

City's innovative projects designed to promote and support the principle of a safe city (City of Cape Town, 2014).

Whereas Cape Town is driving such initiatives from a local government perspective, Kenya has a mixed-method approach which includes partnerships with public and private sector companies through a number of initiatives as part of the response to issues of safety and security. In its attempt to address current security issues, the Kenyan government has increased intelligence systems, surveillance and police visibility and, as Atta-Asamoah (2015) reports, the government has also incorporated several other local innovative initiatives such as:

- The 'Usalama' platform initiative – translated as 'safety' in the local language. The objective of this platform is to act as an inter-agency initiative between security agencies and the public, aimed at ensuring an integrated response to security issues. It is a central command and control centre armed with an analysis centre based on real-time inputs and monitoring of situations.
- Nyumba Kumi' – a Swahili concept for 'ten households'. The Nyumba Kumi initiative's primary objective is to enable community members to get to know each other, to share information among themselves about potential threats to their neighbourhood. However, the concept is not rigidly based on ten households, the number and size is based on facts such as geographical size and composition of membership based on population density, period, culture, demography and culture.
- The Nairobi Metropolitan Command; not all solutions to these challenges have a technological investment attached to it. In December 2013, the government announced the establishment of the Nairobi Metropolitan Command Unit of the defence force, charged with combating threats of terrorism; drug trafficking, small arms proliferation and crime, particularly in Nairobi where these issues are more prominent. The unit is required to respond to crises and disasters, act as a focal point for cyber security, coordinate counter terrorism operations and protect vital military installations. The expectation is that the Unit will function independently of operational police responsibilities (Atta-Asamoah, 2015).

Media coverage of Kenyan news by the BBC has reported on the government's efforts to collaborate with the private sector for initiatives addressing security, such as the partnership formed with a technology company, Huawei, for its Safe Cities' solutions (BBC, 2015). Huawei has put in place a new communications network that links 1,800 surveillance cameras with 195 police bureaus and 7,600 police officers. This enables authorities to integrate a diverse range of information (BBC, 2015). The idea is to digitise and centralise records, even though in Nairobi, innovation in the areas of public records and information systems has been slow and sporadic.

Respondents in Nairobi noted the following:

In most African governments, you find that everything is done in silos. You find every government by itself, the ministries are in silos. We would look at all the different running of the departments, sectors of a city from administration to the facilities it offers like transportation, health, education and all the departments that they are run efficiently. The use of information technology (IT) would take a big centre stage so it can effectively coordinate all this, you know at a touch of a button you can actually see information and see how to match departments with one another to get the best effects (R14N - Government).

From the arguments and respondents' comments above, we see that there is an urgent need for centralisation, integration, sharing and storage of data and a strong mobilisation for the adoption of technological solutions in both Cape Town and Nairobi around issues of safety and security. In Kenya, the thinking behind these various initiatives is to mobilise for community policing and citizen participation in the pursuit of a safer city. As a result, security is being conceived as a core national value that calls for communities to collaborate with government to provide security tips through conscious tracking of threats in neighbourhoods and a willingness to tip off security agencies to take appropriate action (Atta-Asamoah, 2015).

There are many examples designed to address issues of safety and security that plague cities in Africa. Crime, violence and other social ills are commonly identified as challenges affecting a city's image, reputation and prosperity. The cities of Cape

Town and Nairobi are not exempt. The ways in which they are responding to these issues and challenges are not the same either. Yet safety and security is still high on both their Smart City agendas.

Whereas Cape Town appears to have assigned this responsibility for safety and security to the city's local government directorate, Kenya, and particularly Nairobi, has adopted various methods driven from a public and private sector perspective. This is in all likelihood due to the sophistication and complexity of issues, especially those linked to terrorism and the threat it poses to the city and the whole country. The issue of safety and security is of importance and urgency in both Cape Town and Nairobi. The programs implemented to address this issue involve all stakeholders (residents, businesses, visitors, tourists), as such, the government's role is highlighted as the stakeholder responsible to ensure the city is safe to live in and conduct business in as well as to visit. There is a sense of urgency in dealing with issues of safety and security of these cities, particularly in Nairobi.

4.3.4 The Digital Divide and Social Inclusion

As South Africa's history has had a role in the shaping of how cities are structured and managed, cities within South Africa are economically and socially fragmented (Odendaal, 2006). The Apartheid era played a significant role in many of the governance structures, municipal processes and societal order. However, the country's post-Apartheid development policies have focused on establishing new local municipal systems to create governance platforms that are unified for service delivery, economic empowerment and social development, especially in communities considered previously disadvantaged (Odendaal, 2006).

The time at which South Africa became a democratic republic (1994), coincides with an era in which ICT, especially in Africa, was slowly becoming mainstream in sectors of business, administration and transportation. ICT has had an impact in the ways African cities are being managed. For example, transport networks can be monitored through systems or, utilities disseminated and managed through automated information systems. However, there are challenges socially and economically. One of the limiting challenges is the relationship between the digital divide and social inequality (Kvasny & Keil, 2006), and ICT's ability to either exacerbate social exclusion in a digital society or as a tool to shrink the divide.

In reviewing Cape Town and Nairobi's Smart City agendas, and the primary data, it emerged that, part of the reason for the adoption of ICT is to deal with social and economic issues of inequality irrespective of how they arose. The belief is that ICT has the capability and potential, when rightly used, for a wider impact. Because of this potential and capability, putting in place programs that would narrow the digital divide is key for increasing participation, awareness and accessibility to economic opportunities and to promote participation for advancements in social and economic development.

Some of the simple ways in which social inclusion is being promoted is through the use of social media networks i.e. Facebook, Twitter, apps. In Cape Town and Nairobi, the wider roll-out of optic fibre network cable and provision of free Wi-Fi hot spots are part of the objective to promote inclusion in economic and social matters.

Comments by some respondents in Cape Town indicated that part of the reason for the adoption of a Smart City agenda was to deal particularly with issues of social inclusion which is considered a precursor to shrinking the existing gaps economically and socially. The respondents said:

Another thing is how do we make sure that it is inclusive that we do not have people who because of historical reasons are forced out of this new way of working coz they do not have access to internet. So it's about digital inclusion, about how do we make sure we do not create this digital divide that they keep talking about. For instance, talk about public Wi-Fi, various initiatives in our libraries about training people to use technology (R7CT - Government).

Another respondent echoed this point, adding that, government has a role in ensuring that city services and administration run efficiently and effectively, which benefits residents.

You can't just try play to one audience, so what we need to understand is who is Cape Town? Cape Town is business. Cape Town are citizens. Cape Town is about tourists, but you need to keep everybody happy. We can't just focus on tourists for instance,

because then it's going to create other social problems. So a lot of the emphasis of what Cape Town does is that if we can make the citizens of Cape Town happy and prosperous, then the city will prosper (R11CT - Government).

It is important to note that, the term social inclusion was not explicitly used by interview respondents in Cape Town, but, the words and terminology used in the text, such as; 'social development', 'not eliminating anyone', 'doing it for the people or for the citizens', seem to suggest that in part, ICT adoption is targeted at addressing issues of social inclusion, digital divide and economic inequalities.

Similarly, respondents in Nairobi did not make mention of or use words such as social inclusion or the effects of the digital divide. The articulation of social inclusion and digital divide issues were more closely tied to economic issues of employment, job opportunities, and skills development in ICT. Perhaps this is more evident in Nairobi given that the country's history is not the same as the South African context. But like most African cities, issues of employment, up to date educational programs and basic needs are still much more of a priority than sophisticated technological pursuits. Irrespective of this fact, Nairobi currently has an ICT strategy designed to address and cater for all residents. The broader objective is to have every resident connected to the internet and empower those in urban and rural settings to access educational and skills development programs, employment opportunities and many other benefits.

Some of the programs that Nairobi has implemented promote an inclusive society. One is through the city-wide roll-out of broadband network fibre. This provides residents with internet access, for example cheaper Wi-Fi access, and another is through partnerships with technology companies for programs in digital literacy and skills development.

It seems as though programs implemented to address social inclusion in the two cities focus on residents, particularly poorer residents, as stakeholders. Cities make a distinction between wealthy residents (empowered, digitally connected residents) versus poorer residents (disempowered, excluded residents) as impacted stakeholders. The dynamics of these residents also have an influence into which

issues are addressed with urgency. Wealthy residents often have more power and legitimacy over issues as opposed to poorer residents, however, the government's (responsible) role is to balance the unequal stakeholder dynamics to ensure that the needs of poorer residents (impacted) are treated with as much urgency and legitimacy as those of wealthy residents. The interests of poorer stakeholders are recognised by government as needing support.

Just as the Smart City agendas of Cape Town and Nairobi are addressing social issues, economic and environmental factors also form part of the agenda and these will be discussed in the sections that follow.

4.4 ECONOMIC ISSUES

4.4.1 Competitive global economic and financial environments

We are operating in an era of a globally connected world. The continuous pursuit of economic opportunities and social benefits by urbanising populations has placed pressure on cities in developed and developing countries and this can be viewed in a positive or negative light.

The term globalisation is considered a phenomenon that has changed the nature of economic activities in cities, more so with the introduction of technology. According to Tasan-Kok and Weesep (2007), globalisation is the accelerated circulation of people, commodities, capital, identities, and images through global space, as well as the increasing mobility of ideologies, economic principals, policies and lifestyles. It is a phenomenon that generally covers social, cultural, and political dimensions linked to an economic process, although it is not the only force that brings about change in cities (Tasan-Kok & Weesep, 2007).

The Mckinsey Global Institute report (2012), estimates that by 2025 the largest cities in the world will account for 60% of the global GDP growth, while midsized cities in a developing region will contribute 40%. As a result of the role that cities play in the global market, cities aim to position themselves in the global economy by increasing their competitive advantage. A mixture of social, political and economic strategies pursued by cities promotes economic growth and stimulates extra-economic

development. Such strategies are referred to as competitive advantage (Jessop & Sum, 2000).

City competitiveness is defined by the World Economic Forum (WEF, 2016) as the set of factors that includes: policies, institutions, strategies and processes that determine the level of a city's sustainable productivity. Countries that seek greater competition are requiring local government to take strategic measures to enhance city competitiveness that will create employment and attract investments locally and internationally.

However, technology has the capacity to enable and enhance development given its capacity for broadening and disseminating information, and this is key for a city aiming to become economically sustainable and competitive (Odendaal, 2006). Some of the ways cities are responding is by pursuing transformative Smart City initiatives that will foster a competitive economy through modern infrastructure (Angelidou, 2014).

The economic growth strategy of Cape Town (2013) points out that every city needs to embrace innovation in the provision of basic services in order to lay the foundation for economic growth and job creation. The strategies range from investing in strategic infrastructure to providing adequate electricity, water and sanitation. In doing so, Cape Town has opted to implement a modern infrastructure that supports these goals, from basic services to rolling out efficient public transport and ensuring predictable and transparent regulatory processes (EGS, 2013). Interviews with city leaders in Cape Town and Nairobi revealed a number of common themes setting the agenda for their competitive global economic and financial environments.

Cape Town uses technology and digital processes to boost economic activity by providing residents with various channels and platforms to connect them to opportunities. These platforms are mostly enabled by technology infrastructure that promotes and improves communication between the city and its residents in the areas of administration, service delivery and innovation. The city has, over the last 15 years, invested heavily in technological assets that support administration, service delivery and communication channels. Examples of such investments

include the implementation of the SAP ERP in 2002, Broadband Network fibre in 2009 and the Open Data portal in 2014 (City of Cape Town, 2015)

In Nairobi, the strategy is centred around marketing, positioning and promoting Kenya as an innovation hub, locally and internationally, especially promoting business process outsourcing (BPO), upgrading transportation networks and making the financial services market more fluid in an effort to create an economically and technologically inclusive society (BBVA Research, 2014). As an interview respondent in Nairobi pointed out:

The main reason for Konza was to create a new economy driver for this country, the focus was on how do we generate a new economic driver focusing on technology and a knowledge based economy (R23N - Government).

In the last decade, Kenya has been on the rise in technological innovations, and one of these areas in which the Kenyan government is leading in Africa is in mobile technologies (IBM, 2011). A notable case is the widely adopted mobile payment and money transfer application called M-pesa. M-pesa was launched in 2007 as a mobile banking and payment system and has gained popularity with a large reach to the wider Kenyan community formally and informally. M-pesa is understood to have created an environment where even the most poverty stricken residents are 'financially included'. According to di Castri (2013), over 18 million Kenyans use the mobile service, with an 86% penetration rate amongst families. Research conducted on the application reports that M-pesa has provided the wider Kenyan population the opportunity to harness economic opportunities such as: increasing employment opportunities, increasing money circulation, facilitating social capital accumulation, and facilitating savings, amongst others (BBVA Research, 2014; di Castri, 2013; Osah, 2015).

In terms of transportation networks, there are many cases reported. An example is that of Coca Cola. The Coca Cola Company has operated in the East African region for close to 70 years. Their operations include the manufacture and distribution of several beverages produced by the company. The multinational business related some of the issues and challenges of functioning as a business in the region

including Nairobi. Urban congestion has made business life increasingly difficult and many of the infrastructure projects currently underway in the country especially those focussed on developing road networks will benefit such businesses (Njonjo, 2015).

Sometimes infrastructure of a different kind is needed. A respondent in Cape Town reflected that:

There are many areas in Cape Town where the telecommunication infrastructure is not capacitated to drive the kind of programs we wanted to drive. So that led to us putting up telecommunication infrastructure for ourselves like laying optic fibre and this is making spare capacity available to drive other economic and social benefits (R1CT - Government).

However, compared to Cape Town, Nairobi has a fairly young Smart City agenda and a greater portion of it is still conceptual. In addition, these two cities' differences in economic, political, geographic and historic contexts are influencing the specific Smart Cities initiatives being pursued. Nairobi is the largest city in the East African region and concentrates most economic, social, political and administrative activities in the areas of finance, manufacturing, agriculture, and services, as well as the rising market for technological innovations. By contrast, Cape Town is in a country where most economic, political and financial activities are decentralised across other major cities such as Pretoria, Johannesburg and Durban. As a result, the pressures and complexities in managing the cities are reflected differently as the decentralisation assists Cape Town to focus on specific economic streams unique to the city.

In Cape Town and Nairobi, economic development and the impact of globalising economies affect all stakeholders of the cities. The programs implemented are reflective of the cities interests in ensuring that stakeholders such as local business are empowered in two areas. Firstly, to thrive in business locally, to increase jobs for locals and to contribute towards the country's GDP. The long and short term economic benefits of the Smart City agenda were emphasised by a respondent who said that "our quick expectation is that it will create jobs through the technology that will put there as short term, the second expectation it will spur economic growth for the entire Kenya region by creating job opportunities both local and international

where we will attract investors, foreign investment (R16N - University). Secondly, to empower businesses to compete on an international level and for this, policies and infrastructure are in place to position businesses and government to fit in with global norms of competitiveness. ICT helps government and business to interact, manage, service, communicate, support and facilitate these transactions and engagements.

4.5 ENVIRONMENTAL ISSUES

4.5.1 Diminishing Natural Resource Base and Natural Disasters

As more people migrate to urban areas, the strain imposed on cities' already limited resources and basic services like energy, water, roads, schools, housing, hospitals and transportation often leads to either scarcity or pressurised rationing (Washburn & Sindhu., 2010). Not only are these resources and services limited in supply, they are often poorly managed.

On a global scale, the conditions of many of the natural resources in cities have become inadequate with alarming shortages due to the demand by rapidly growing populations (Washburn & Sindhu, 2010). The essential areas in which cities feel pressure in terms of management, distribution and accountability are power, water, land and food. This is especially evident in developing countries, where service outages and interruptions are in some places a daily occurrence.

Cities in Africa and other parts of the world are responding to rising environmental issues propelled by rising climate change and rapid urbanisation placing stress on urban living (UN, 2013). This realisation is prompting cities to find new ways of managing and rationing key resources such as water, sanitation, land, power and waste management (Washburn & Sindhu, 2010). For most, transforming their cities into smarter cities is the alternative response strategy as compared to the traditional means or methods of managing a city (Washburn & Sindhu., 2010). The alternative is driven by the potential and capability provided by technological advancements in ICT and how technology has demonstrated its usefulness in a number of ways. For example, automation of manual processes, the use of early warning systems to cities more inclined to natural disasters or the monitoring of resources such as water, power and disposal of waste material. Climate change accelerates environmental degradation and worsens its impact on human livelihoods (UN, 2013). But,

technological advancements provide hope in preparing for and mitigating risks associated with environmental changes or unforeseen shortages in resources such as water or food.

Cape Town and Nairobi are cities affected by rapid urbanisation as well as climate changes. In South Africa, the Western Cape Province records high instances of natural disasters such as wildfires, floods and storms and Kenya, particularly Nairobi, is also prone to natural disasters like flash floods, drought and fires, amongst other hazards (KPS, 2016). Flooding and drought are the most common environmental hazards in Kenya because during the wet seasons, flooding occurs with little or no warning and usually interrupts transport networks and communication (KPS, 2016).

The issue of diminishing natural resource base such as water and the use of Information Systems were mentioned by a respondent in Cape Town who said “through Smart city initiatives we try and manage the demand of those resources, e.g. water as an example. How do we help manage the fact that we live in a water-scarce area?” (R1CT-Government). The point was confirmed with more recent reports in early March 2017 that the City of Cape Town is experiencing water shortages due to a drought caused by lack of rain fall in the Western Cape region (City of Cape Town, 2017). This has been attributed partly to climate changes which resulted in low rainfall. Low rainfall affected water dam levels which dropped by a considerable 10% from the required. But, the use of early warning systems and technologies assisted the city in issuing out warnings and placing restrictions on water usage and access (City of Cape Town, 2017).

Just as Cape Town is dealing with diminishing resources such as water due to a drought, Nairobi is also prone to natural disasters. In April 2016 media records that residents in Nairobi were caught up in flash floods after a storm brought by heavy rainfall (Juma, 2016). A week before the floods, the Kenya Meteorological Department had issued a severe weather warning and advisory targeted at the whole city. The warnings were able to alert residents to the impending danger of the approaching storm in good time through social media and other communication channels viable for the city. Based on these facts and as part of the responses and adaptive strategies to issues of scarcity and natural disasters, Nairobi and Cape Town echo the importance of using ICT. A respondent in Nairobi said “A Smart City,

usually, they think several years ahead, it makes provisions for infrastructure, they are able to gather data from the technology which would help them make decisions for e.g., if you want to monitor sewerage if it needs expansion” (R13N-University) emphasising the role of ICT in longer-term resilience.

Diminishing natural resources and natural disasters both reflect the urgency of environmental issues affecting all stakeholders of the cities. Programs implemented in Cape Town and Nairobi reflects city government’s responsibility to provide and manage key resources. ICT helps government to carry out its responsibilities to manage, interact with and assist residents to deal with the consequences of external forces such as changing weather patterns and growing populations in the cities.

4.6 INFRASTRUCTURE DEVELOPMENT

4.6.1 Infrastructure

Smart cities consist of both hard infrastructures, for example houses, roads, bridges, rail, and those that support and provide for the development of infrastructure such as governance, leadership and innovation. Implementation of new infrastructure and the upgrading of existing infrastructure, enabled by technology, have also been identified as key to Smart Cities (Deloitte, 2014).

A widespread belief that at the core of every Smart City is the adoption, integration and use of technology also emerges as a theme for Cape Town and Nairobi. This is reflected in changes in the channels through which services are disseminated, opportunities are presented and interaction is facilitated. However, there are differences in the approaches taken by these two cities to improving on the existing infrastructure.

The state of the African Cities 2010 by the UN-Habitat reports that inadequate urban governance policies and low urban institutional capacities, plus the limited options for the poor to access urban land, all contribute towards slum proliferation in urban centres. Suggestions to change existing urban planning approaches to more proactive and inclusive models are also supported and recommended by development agencies and civil society (UN-Habitat, 2010). In Africa, some city governments, especially in the capitals, are mobilising alternative development strategies and reforming strategies in a number of ways (Black & Veatch, 2016; UN-Habitat, 2010). These include: (i) upgrading informal settlements through provision of integrated infrastructure and services that also include marginalized groups; (ii) mobilising urban financing from local and foreign investors; (iii) diversification of economic activities through the creation of new economic hubs; and (iv) proactively developing and implementing well-planned urban development strategies that also strengthen the role of municipalities (Black & Veatch, 2016; UN-Habitat, 2010).

A comparative case study by Odendaal (2003) of Smart City initiatives in Durban (South Africa) and Brisbane (Australia), points out the crucial role and purpose of local government in development and that good local governance requires the

capacity to respond to local challenges, and to act and move beyond traditional bureaucratic procedures.

4.6.2 Cape Town and Nairobi's response to infrastructure development

For Cape Town, not only is the city optimising technology for managing upgrades to infrastructure and to encourage residents to interact differently with the city, the leadership and those tasked with the agenda have realised that a Smart City vision also deals with the socio-cultural elements of change. Change is a complex human phenomenon. It requires the encouragement of all stakeholders to change behaviour patterns; the way they communicate and interact with the city as well as perceptions of the role of the city as local government. A respondent said:

We started asking citizens to transact for themselves and not always have to wait for an official through the city of Cape Town official, standing in a queue to be served, to be processed; therefore, some people can actually help themselves. That was the transformational journey significant to establishing a world-class city administration (R1CT - Government).

For Cape Town, identifying, developing and planning the city's digital infrastructure as a stand-alone strategy is crucial to the city's economic, social and environmental progress and transformation. Over the last 15 years, Cape Town's Smart City agenda has focused on gradual improvements to existing infrastructure, especially those elements that have a service function. That is, the softer infrastructure of innovation, leadership and integrated service provision and ICT infrastructure, especially around service provision and administration. One such example is the implementation of the SAP/ERP application in 2002 and the subsequent enhancements over the last 15-year period, including the roll-out of broadband networks across the city.

Nairobi, on the other hand, acknowledges the pressure of having to manage the demand for infrastructural demands as populations continue to grow. Nairobi's Smart City agenda has taken on two different approaches. One way is through a process of urban renewal, that is, expansion and upgrades to existing physical infrastructure,

such as power sources, roads, buildings, waste systems, water management and distribution systems, and other infrastructure systems for utilities.

African cities, including Accra, Cairo, Kigali, Lagos, and Nairobi, are promoting new urban development projects in the form of Smart Cities or secondary new towns adjacent to the main city (Watson, 2014). The rationale is that the major cities are congested and new towns would ease pressure by redirecting populations away from the existing cities (Watson, 2014). Kenya has specifically earmarked six new towns within the Nairobi City County region as proposed in the NMR 2030.

Figure 2 details the settlement zones proposed for all of the Nairobi County region and the six new towns planned from green field including Konza Technology City which is located 60 km outside Nairobi.

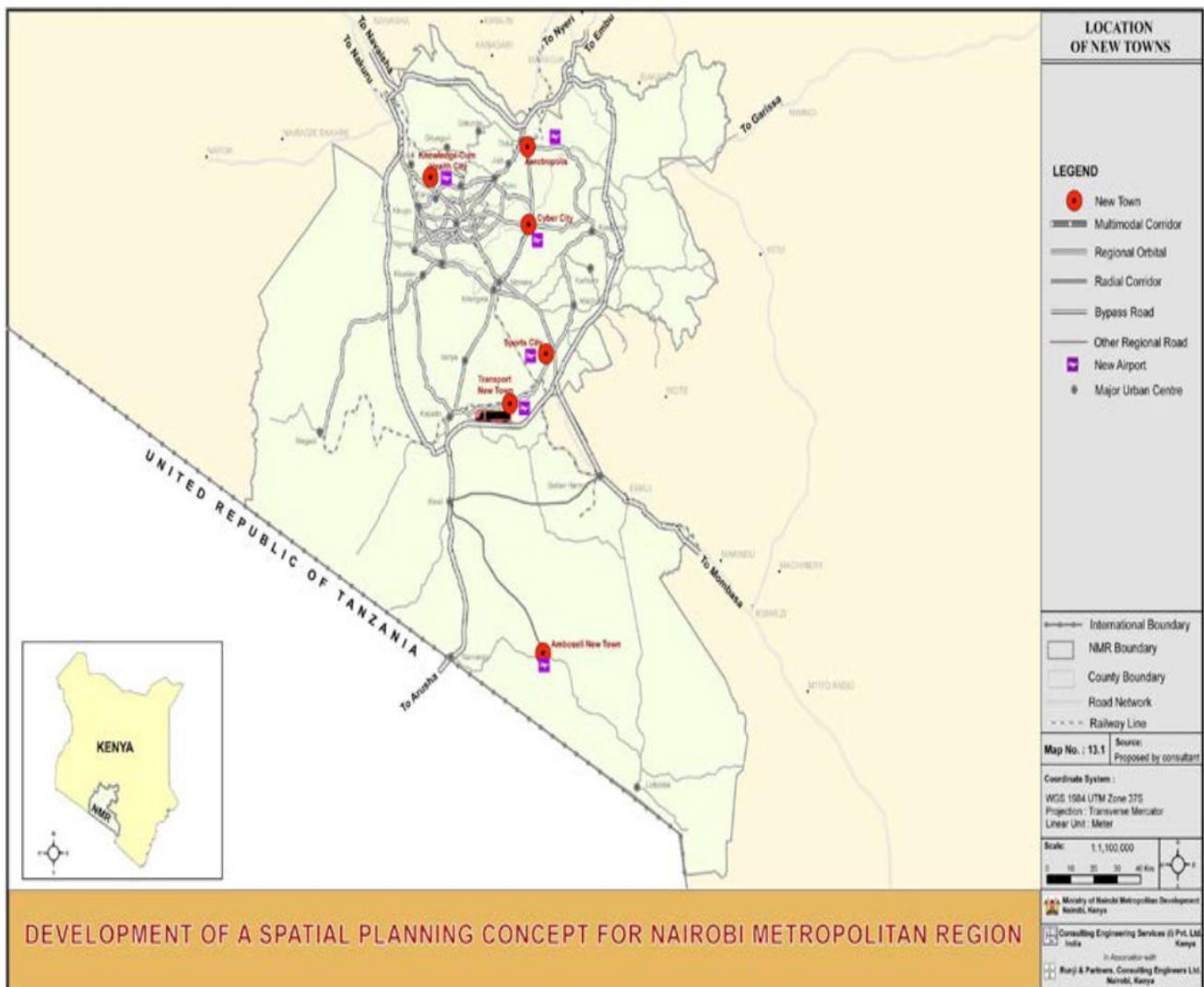


Figure 2: Six new towns proposed in the Nairobi County region. Source: Nairobi Metropolitan Region Plan 2030.

This is not entirely new as cities often make upgrades to existing infrastructure as part of growth and maintenance, however, what appears to be new in this process is the development of new satellite towns, with brand new infrastructure development as part of urban renewal and provision for infrastructure.

In 2012, Nairobi City initiated a Smart Street lighting project in collaboration between Philips, Kenyan Urban Roads Authority and the United Nations Environment Programme (UNEP). The project's aim was to install an 8 lighting solar-powered LED lighting system across the city. The lighting is run on a combination of high-brightness LEDs with patented optics and an intelligent system controller which provides smart charging and discharging.

The Kenyan government in conjunction with private sector (local and international) and civil society aims to demonstrate that a transition to an inclusive green economy is possible and is required in the transformation towards a Smart City (UNEP News, 2012). Similar examples directed at addressing power-related issues and exploiting opportunities of solar power projects within the Nairobi County include: renewable energy plants in Turkana and Naivasha, as well as the solar-powered new offices of the United Nations in Nairobi (UNEP News, 2012).

Improvements to governance infrastructure benefit government directly and city residents including businesses indirectly. Urban renewal and the development of new cities in Africa have benefits for residents and businesses, but they introduce global companies as powerful stakeholders and raise some concern as to whether their interests are being prioritised over those of local stakeholders.

4.7 CHAPTER CONCLUSIONS

The reasons why African cities are adopting Smart City agendas are many. Using the contexts of Cape Town and Nairobi, five drivers emerged. They are: rapid urbanisation; safety and security; social inclusion; competitive global economic and financial environments; and deteriorating natural resources and infrastructure. Although there are local differences, these five drivers are present in both contexts. Differences arise in the ways each city is responding to the drivers.

For example, Cape Town's response to urbanisation appears to be bringing residents closer to the city, while Nairobi is mobilising for populations to move out of the city to the outer regions of the Nairobi County. For security, because Nairobi has urgent high-profile security concerns due to terrorism, the response strategies are varied. Some initiatives are being driven by government while others are driven by the private sector. In comparison, Cape Town has a centralised unit designed to address all safety and security issues driven from a government perspective.

Although Cape Town and Nairobi do not share the same history, these two cities are having to deal with economic and social inequalities perpetuating the disparities between poor and rich communities. What Cape Town and Nairobi have in common is the aim of promoting inclusiveness. Projects promoting inclusion are, for example the roll-out of broadband fibre networks to wider city regions to enable more residents in the cities to connect to the internet.

The two cities have similar agendas in the areas of service provision, administration, transportation, innovation, competitive advantage and connecting people. However, Cape Town and Nairobi's Smart City agendas have other areas like physical infrastructure, safety and security and integrated information systems.

The drivers for adopting Smart City agendas speak to different stakeholder needs prioritised. Rapid urbanisation, safety and security both affect all the stakeholders in the cities. City governments seek Smart City solutions that make it possible for them to carry out their responsibilities for managing the city and keeping it safe. Businesses and residents benefit from efforts to provide better services through the 'soft' infrastructure such as administrative service applications like SAP.

Social inclusion reflects the responsibility of government to meet the needs of the least powerful residents by investing resources in previously disadvantaged groups. Furthermore, findings reflect that the needs of poorer residents can be at odds with those of wealthy residents, global business, tourists and visitors. However, government seeks to balance these, using moral arguments to strengthen legitimacy of their claims, especially those specific to less empowered residents.

Competitive global economic and financial environments reflect the legitimacy of needs of stakeholders such as businesses, government and residents. In Nairobi, other stakeholders such international companies are also prioritised as stakeholders for the business operations and the connection to the global economy.

Diminishing natural resources and natural disasters both reflect the urgency of environmental issues affecting all stakeholders of the city. Programs implemented reflect city government's responsibility in provisioning. ICT helps government to carry out its responsibilities to manage, interact with and assist residents to deal with the consequences of external forces.

Government is responsible for provisioning but the expectation by empowered residents is that government prioritises the provision of modern infrastructure, while less empowered residents' basic needs of provisioning for water and infrastructure for engagement and participation should also be treated with urgency and legitimacy.

Gaining understanding of the reasons why these two African cities are adopting Smart City agendas sheds light on what informs the objectives of the agendas. These reasons act as a catalyst to each city's objectives and priorities designed to address the challenges or opportunities available in all key areas of a city. The next chapter discusses in detail how Cape Town and Nairobi arrive at the set objectives, that is priorities, anticipated benefits and targeted beneficiaries of the Smart City agendas.

CHAPTER FIVE: OBJECTIVES FOR SMART CITY AGENDAS

5.1 INTRODUCTION

This chapter presents the data findings of the study in relation to the second objective, namely: What are the objectives (priorities, anticipated benefits and beneficiaries) for the Smart City agendas for the cities of Cape Town and Nairobi? The chapter reflects on both primary and secondary data and is structured as follows: objectives and priorities for each city, followed by the anticipated benefits and beneficiaries. Lastly, a comparative discussion of these will be presented for the two cities.

5.2 HOW AFRICAN CITIES DEFINE A SMART CITY

In chapter two of this study, a discussion was presented around the various definitions of a Smart City. The discussion presented the term 'Smart City' from the point of view of the literature on the subject and explained how it is used synonymously and interchangeably with terms such as intelligent city, eco-city, knowledge city, information city, wired city, digital city, virtual city (Caragliu et al., 2011). The literature reports that the use and diffusion of Smart City initiatives across cities worldwide with different needs and contextual conditions makes it difficult to identify a shared definition (Neirottie et al., 2014). Because of the ongoing debate, no consensus has been reached yet of the exact meaning of the term Smart City or on what the characteristic attributes are.

Data revealed five leading themes in the way Cape Town and Nairobi define Smart Cities. These themes are technology, connecting and interacting, modernity and innovation, service delivery, and sustainability. These themes were common in both Cape Town and Nairobi and the data is presented here.

Some respondents highlighted the central role of technology in a Smart City: 'A Smart City is the enablement for people to interact with each other, with local government and businesses, so it's the interaction made easier by technology' (R2CT - Government). Others in Nairobi also stated that 'The goal is to create a place where we could easily develop the ecosystem that could support technology' (R13N - University). Another response was:

According to me, a smart city is one which there are so many activities going on in the city touching on technology and given that Kenya is geared on vision 2030, where the country is expected to industrialize by that time. I think they are bringing up Smart City in search of technology so that we can realize that vision of the year 2030 (R17N - Resident).

Although the central role of technology is emphasised as part of a Smart City, other views such as transacting were expressed:

I define a Smart City as a connected city first and foremost then, on top of that internet connectivity for building very strong and robust applications that allow ratepayers, businesses and city custodians to transact easily (R1CT - Government).

Another added that

It's our systems, it's our data, it's our people all up there in terms of best competent staff. Are they trained correctly? Do we have the correct staff in place? Are our systems correct, world class efficient systems and do I have business processors that will make it most efficient and smart people to be able to transact with us? (R3CT - Government).

This respondent expressed how a Smart City also provides for connectivity and how interaction is made easy in a Smart City: "I define a Smart City as a connected city first, and that for me, a Smart City is the enablement for people to interact with each other" (R2CT - Government). The underlying assumption though is that technology is core to such a city because technology has enabled people to communicate more easily, faster and it is cheaper.

Others' perceptions of a Smart City are linked with modernity and innovation. This image is associated with infrastructure and a futuristic and innovative way of life. One respondent said

We wanted to develop the most modern infrastructure that would support a modern city, e.g. we needed to make provision for water, fibre optics, electricity such that, when tech changes and we have to deploy, we don't have to dig. Usually, in a Smart City, they think several years ahead. It makes provisions for infrastructure that is able to gather data from the technology which would help make decisions (R13N - University).

Another respondent also said 'It's just about being innovative in doing things better and that's the broadest possible definition of the Smart City' (R4CT - Government).

As part of the image of a Smart City, a well-managed city is evaluated based on local government's ability to operate and provide key city functions to deliver efficient services. It appears that initiatives being pursued in Cape Town and Nairobi are to enhance capabilities using ICT to deliver value-added services to the city. One respondent said: 'The use of ICT to bring efficiency and effectiveness of service delivery so that is what defines the smartness of a city' (R17N - Citizen) and ways in which this is being realised is through the adoption of smart utilities as a cornerstone to integrating all aspects of city services. Another respondent expressed it this way:

The word itself to me, it would mean a city that is running efficiently. And efficiency we would have to look at all the different running of the departments, sectors of the city from administration to facilities it offers and transportation, health, education, and all the departments that they are run efficiently (R21N - Citizen).

As a value-add proposition, the concept of sustainability is viewed as one in which cities implement measures towards sustainability socially, economically and environmentally. Part of how Cape Town and Nairobi define a Smart City is through creating a sustainable city. Some officials noted that 'a smart city entails adopting sustainability concepts in its design development and operation' and that aspects of sustainability include the following:

A renewed focus on digital within Cape Town and Smart could be energy efficiency, sustainable environment considerations, and

those are still our priorities; around sustainability, around what the strategic objectives of being a smart city such as being an inclusive city, a well-run city (R1CT - Government).

These five themes emerged as aspects of how Cape Town and Nairobi define a Smart City. Many of these are common and overlapping to both cities, such as technology, connecting and interacting. However, it appears that certain themes are more prevalent in Cape Town compared to Nairobi. For example, service delivery, connectivity and interaction are emphasised more in Cape Town, while technology, modernity and innovation, and sustainability are more dominant themes for Nairobi.

In Kenya, Konza Technology City is marketed as a 'Smart City'. To be exact, the master plans, as well as other supporting documents such as media reports, mention that 'Konza Techno City is a Smart City; Konza is Africa's silicon savannah' (Master Plan, 2014). Konza Techno City is a flagship project born out of Kenya's 2030 vision development blueprint, aimed at transforming Kenya into a prosperous, globally competitive middle-income country by year 2030. The new city represents an ambitious vision of a modern, all-inclusive and sustainable urban centre in Kenya. Konza has been designed and is being built from scratch on approximately 5000 acres of land 60 km adjacent to the Kenyan capital, Nairobi. Key themes of the new city are sustainability, business opportunities aimed at economic growth, a modern lifestyle and a technology park.

Although the Smart City concept is growing in popularity within African cities, there are still ambiguities about the phenomenon. The vagueness of the term is reflected in some of the responses expressed by informants. This is what some of them said: 'Smart City, I don't know what exactly it entails but from the word itself to me it would mean a city that is running efficiently' (R19N - Business); and others expressed it this way: 'Smart City, it's a vague discipline' (R3CT - Government). While some respondents at least tried to provide what their understandings are, others had no idea and requested that I explain what a Smart City means or that 'Unless I Google if you allow me and then I answer you' (R15N - Citizen).

The 'newness' of the idea in Nairobi can be detected from residents' articulation of the concept which has a similarity to the version marketed by IT companies such as

CISCO and IBM. The indication is that those tasked with the project, such as representatives of the government, the private sector and related stakeholders, have attained a level of understanding of the concept based on the work, associations and exposure acquired. However, of the various categories of stakeholders interviewed, citizens and businesses as such are still trying to understand it in meaning and applicability.

It is worth noting that the concept is still fairly new in understanding as well as its application within the African context because even in cities in Europe, Asia and America where the concept originates, it is still not clearly defined. Black and Veatch smart utility report (2016), states that although the Smart City concept is gaining momentum around the world, there is some level of confusion and misperceptions persist that require a need for more effective communication, implementation approaches and mind-sets. The report notes that more than 90 percent of government and municipal cities surveyed view Smart City initiatives as transformational with the potential for long-term positive impacts on city development and this is reflected in the understandings expressed by respondents.

The understanding is that ICT is key in enabling a city to perform and function at a heightened level by simplifying the complexities of local government in managing a city with large populations. There is general consensus within the Smart Cities' literature about the wide use of ICT (Backhouse & Cohen, 2014) and as an enabler that has helped cities manage and make better use of city resources (Nam & Pardo, 2011).

The city of Cape Town initiated its first Smart City agenda in the early 2000s. The agenda explored the various ways in which the city could harness technology to achieve its strategic objectives around the following areas: growing the economy, creating jobs, improving engagement with residents and broadening access to high-quality public services (IDP, 2012). For 15 years, Cape Town has referred to itself as a "Smart City", even though the city has not noted down exactly what it means. The working definition associated with its long-standing Smart City agenda resonates with Caragliu et al. (2011, p. 16) who state that

A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.

In 2012, the city of Cape Town's 5-year Integrated Development Plan (IDP) of 2012-2017 was released containing a digital strategy. In this document, the use of the term 'digital city' has replaced the initial term 'Smart City'. While there is no universally acknowledged or defined terms yet for 'Smart City' and 'Digital City', both terms are used to describe the process through which city governments are using ICT to leverage the opportunities and respond to challenges associated with concentrated urbanism (Dameri, 2014).

The rationale is that a digital city mainly describes the technological interventions in urban areas, while Smart City is a broader reference which includes features of everyday life such as green areas, reduction in air pollution, water and energy saving and general sustainability (Dameri, 2014). While the City of Cape Town adopts a broad range of Smart City elements in its long-term strategic planning and policy frameworks, the shift to a digital city focuses on the emerging trends around the ubiquitous use of digital devices, availability of technology and tech-enabled business processes (Dameri, 2014; Digital strategy, 2015).

Comparatively, Cape Town has a 15-year long Smart City agenda which has seen gradual development, growth and change over this time period, while Nairobi's Smart City agenda was developed in the late 2000s (2009) and a good portion of it has only reached stages of sign-off and implementation in the last couple of years. Cape Town, for example, initiated and implemented a number of projects in various areas which are now at maturation stages; projects like the SmartCape project of 2002, SAP/ERP of 2003 and the citizen portal of 2008. The organisation and communities in which the concept was introduced have changed and evolved with it, hence the language around the concept's meaning and applicability specifically to Cape Town sound a little more advanced and sophisticated. One respondent expressed the timelines and changes to the strategy this way:

There's been an evolution in the city's approach to being a smart city so you probably would've seen online that we had a smart city strategy that was developed in the early 2000s and we are now doing a review of that more and putting out our digital cities' strategy. Since the late 2000s we've been thinking a lot more about using technology and using digital processes to boost our economy, to get people connected to opportunities, to improve communication between the city and its residents, and as part of that process you realize that if you want to move on to digital platforms you have to make sure that those platforms are inclusive. So we've invested quite a lot since the late 2000s in digital infrastructure (R9CT - Government).

As compared to Nairobi, Cape Town's agenda sounds more sophisticated and a level higher in the Smart Cities' concept. The choice of words though, indicates a strong focus on service, efficient and effective processes, competent employees and inclusive programs for Cape Town. Part of the reason is because Cape Town has had enough time to identify and define some of the elements of 'Smartness' that are important to the city, while Nairobi is still defining its elements of smartness.

5.3 CAPE TOWN'S OBJECTIVES FOR THE SMART CITY AGENDA

In the period of the late 90s to the mid-2000s, South Africa at national, provincial and local government underwent a laborious restructuring process. This process saw the collapse of 800 local authorities into 284 municipalities (Binns & Nel, 2002). In line with this, new policies, and a new constitution were drafted. The country's 1996 constitution provides for a system of cooperative governance where national, provincial and local government function distinctively, interdependently and in an interrelated fashion (Odendaal, 2006). These structural changes were in response to overcoming the challenges of the apartheid legacy whose structures were designed and operated along racial lines.

The 1996 Constitution establishes the principle of developmental local government municipalities, mandated to adopt and drive socioeconomic development. This requires local government to be the primary agent for the developmental needs of

residents in metropolitan areas such as Cape Town (Odendaal, 2006). The Municipal Systems Act of 2000 formally introduced a centralised form of planning called 'Integrated Development Plans' (IDP) as a form of planning to be adopted by all levels of local government. In South Africa, the IDP is a local government document with a crucial linkage between meeting basic needs and fostering more competitive economic activities (Binns & Nel, 2002).

There are four major pieces of legislation which directly link integrated development planning to the strengthening of local government's role. These are the Constitution of 1996, the Local Government Transition Act of 1996, the Development Facilitation Act of 1995 and the Municipal Systems Act of 2000. In addition, Atkinson (in Odendaal, 2006) suggests that there are three dimensions to the South African local government that increase their status as an agent for development. These are that local government (i) is mandated to deliver on social and economic development goals and therefore, has to be inclusive in its approach; (ii) must pull together various resources in pursuing overall developmental goals for a city, and (iii) be accessible to local residents in the process of development which requires constant interaction between beneficiaries and officials.

In 2001, the City of Cape Town's vision after the restructuring process stated that:

The city government of Cape Town will build a partnership with all its people, to make Cape Town a world-class city in which the quality of every citizen's life steadily improves. Mindful of that which gives our city its unique character, we commit ourselves to nurturing Cape Town's spectacular natural beauty, to preserving its rich heritage and to enriching its existing mix of dynamic cultures (City of Cape Town, 2001).

The City of Cape Town's five-year IDP represents the strategic framework through which the city aimed to realise its vision for Cape Town by building on five pillars. These pillars are called strategic focus areas (SFAs) as they are the overarching 'themes' encompassing all the city's programmes and initiatives which are: a caring city, an inclusive city, a safe city, a well-run city and an opportunity city. These are the five key areas that operate as beacons in guiding the city to inform all of the city's

planning, policy formulation and development plans. Below is an account of how these pillars were described and reflect the city's key objectives as stipulated in the IDP strategy document of (2012–2017):

- i. **The opportunity city** focuses on creating an economically enabling environment in which investment can grow and jobs can be created. The city's intent is to use various avenues to attract investment which will enable creating economic opportunities for individuals.
- ii. **The safe city** is based on the need for safety for citizens but also for the city itself. Though safety is a broad issue that goes beyond policing, the goal is to create truly safe cities that manage disasters and risks, enforce traffic regulations, and provide fire and rescue services. Safety is essential to the public enjoyment of open spaces, city beaches and nature reserves; the fact that Cape Town is a tourist destination also makes it critical that a safe environment is fostered.
- iii. **The caring city** stipulates that in order for Cape Town to be a world-class city, it must be welcoming to all people, and it must make residents feel that their government is doing everything it can for them so that they can truly access opportunities.
- iv. **The inclusive city** is one where everyone has a stake in the future and enjoys a sense of belonging. The pillar was established and founded bearing in mind South Africa's history operated as a divided society along artificial lines. Particular projects and programmes have been designed to ensure that the goal is supported and achieved.
- v. **The well-run city** is the guarantor of all other government programmes. Citizens need to know that their government works for them, is accountable to them and answers to them at all times.

These objectives were sourced and presented here as they are captured in the IDP (2012-2017) document for the City of Cape Town. Figure 3 is a graphical presentation of the set objectives for the city.

Figure 3 : Cape Town's five development pillars.



Source: IDP strategy document of (2012–2017)

When the City of Cape Town designed its first Smart City agenda, the objectives were designed around the five pillars, all informed by key development policies such as the IDP strategy. These five pillars were divided into three major streams. Each stream had an objective.

The first stream had an internal focus and was focused on enabling organisational transformation through technology. The internal focus was to improve systems: ‘How do we make sure business-to-business works efficiently together to make sure they are successful? So the journey is to start by getting our own systems working’ (R6CT- Government). The reason behind this was to improve services centred around administration: ‘We have identified the need for being smarter about technology and enabling better service delivery through those channels’ (R8CT - Government) and in the long-run, to change the way services are being delivered. And technology is:

Using IT to improve service delivery but using it also to improve internal communication and using it to interface better with our

citizens and particularly during the initial phases (R6CT - Government).

The aim was to establish a well-governed city running more efficiently and effectively.

Over time, long and short-term initiatives centred around integration and automation of the city's administration in the areas of water, electricity, finance, human resources, social development, sports and recreation have been pursued. The city management records that, as of 2016, 80% of the city's essential business processes have been digitised, as one respondent indicated that

We've been highly successful in automating the administration. Eighty percent of the City of Cape Town's business processes are digital; they're run on SAP. And I can really quantify it because we have 50 directorates; of the 50 directorates, 80% of them run their core business processes on SAP (R11CT - Government).

The first stream focussed on the needs of government as the responsible stakeholder with an implication that such improvements would ultimately also benefit other stakeholders as government services are improved.

The second stream was externally focused. The objective of this stream was to promote inclusiveness by empowering citizens in the use of technology to communicate with the city, the nation and the globe. This objective is linked to the city's pillar of an 'Inclusive City'. The goal of the inclusive city is to ensure that all residents of Cape Town have a stake in the city's future and enjoy a sense of belonging. The objective is important, given South Africa's history when the country operated along divided racial lines, resulting in certain groups not having had equal opportunities in the way services and resources were provided in education, health, economic opportunities, to services like jobs and business and infrastructure differences. Two respondents in Cape Town said

How do we make sure that it is inclusive that we do not have people who because of historical reasons are forced out of this new way of working because they do not have access to internet? So it's about

digital inclusion, about how do we make sure we do not create this digital divide that they keep talking about (R1CT - Government).

Another respondent added that

If you go back 20 years, there was a big gap in those who had access to technology and those who didn't have access and that was part of the initiative to give access to technology to those who didn't have (R4CT - Government).

There are two main goals to this objective; firstly, it was to build practical ICT skills amongst previously disadvantaged groups on how to use computers and how to connect to the internet. For this, certain projects targeted at previously marginalised groups were prioritised, including the placement of internet-enabled computers in six community libraries within the vicinity of Cape Town. Secondly, it was to provide a strong self-service platform for all residents and businesses. The goal was to support access to local government information such as, to apply for services, to query and pay accounts, access tenders and job opportunities, and access local business support for emerging and small businesses.

The second stream focussed on residents, particularly the poorer residents with a view to improving services to these stakeholders and, in particular to give more of a voice to these less powerful stakeholders. The city makes a moral argument for the legitimacy of these stakeholders and their needs.

The third stream focuses on the adoption of ICT specifically targeted to boost and support economic growth. The goal is to stimulate an economically enabling environment in which investments can be made and a significant contribution to job creation. This stream is directly linked to the city's first pillar which is the 'Opportunity City'. Key projects targeted in this stream include the citywide roll-out of optic fibre network and the expanded public works programme for the period 2009–2014. The aim of this project was to create 4,5 million work opportunities by the end of 2014. Similarly, the Cape Town Activa strategy, which aims to create multi-stakeholder networks targeted at entrepreneurs to access services and resources provided by the city. One respondent said 'The digital economy side of this focuses on what

we're doing to enable an active MICT sector because we see it as a kind of a core centre for the city's future economic growth' (R5CT- Government), adding that 'The broadband roll-out, by the way, is mostly intended for citizen access. You can also understand that a connected city for citizens is also a connected city for businesses' (R11CT - Government).

The third stream addresses the needs of a wide variety of stakeholders including residents, business, investors and government.

Between the period 2014 to 2016, the City of Cape Town's Smart City strategy underwent a review process with a renewed focus. The strategy was renamed to a Digital Strategy 2015. The new strategy articulates, and is integrated with, high-level key national- provincial- and city-level development strategies. These include the National Development Plan, OneCape2040, CDS, Economic Growth Strategy, Social Development Strategy, and Integrated Development Plan.

According to the City of Cape Town, the intent of the agenda is to direct and shape future Smart City initiatives and investments in a concerted way for the betterment of the city and all its citizens. The Digital City strategy 2015 outlines how the City of Cape Town will use ICT to grow the economy, improve service delivery and ultimately enhance quality of life. The strategy is framed through four dimensions of digital competitiveness as depicted in Figure 4. It is framed by four key objectives and these are: digital government, digital inclusion, digital economy, and digital infrastructure.

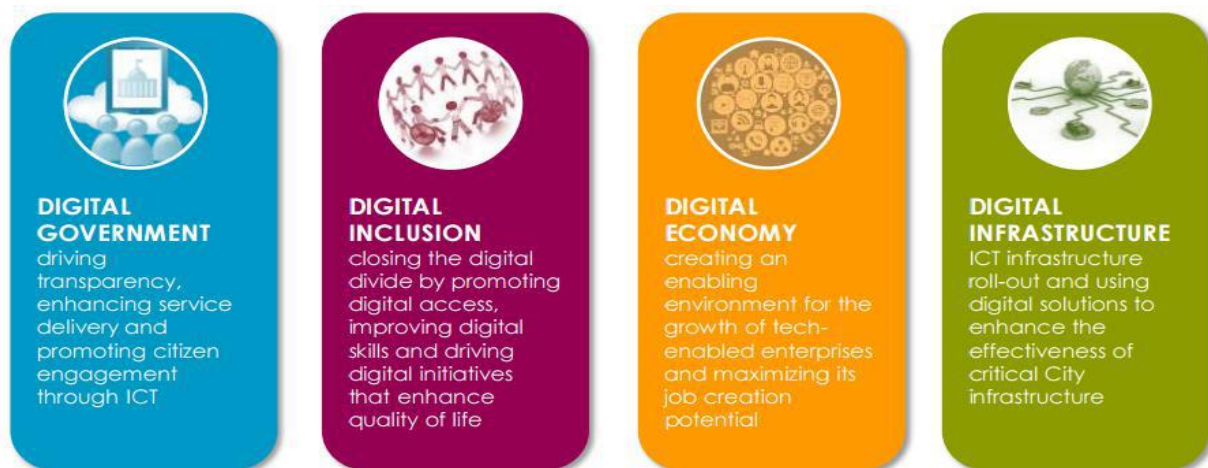


Figure 4: City of Cape Town's digital strategy pillars. Source: City of Cape Town, Digital City Strategy document, 2015.

For each objective, specific programmes designed to achieve these streams have been formed and prioritised. Each one of these objectives is supported by an ICT platform. A considerable amount of ICT infrastructure investment has been made and continues to be a priority for the city, for example, the broadband network fibre roll-out. One responded noted that as of February 2016, Cape Town had rolled out 770 km of broadband fibre across the city (what we have done is that we have got the broadband roll out which is about now 770 km of fiber optic cable that we've placed in Cape Town. And the way we model for that is to say that we wanted to first connect all our city buildings with fiber optic cable because that would then bring down communication costs as a city (R6 CT- Government). The goal is to ensure that city buildings are connected with the aim of cutting down on communication costs for the city by promoting and supporting a digital government and enabling an inclusive society for all residents, and growing a digital economy using digital solutions to prosper the city. In essence, Cape Town's Smart City agenda prioritises these four streams which have matured over the last 15 years.

5.4 NAIROBI'S OBJECTIVES FOR THE SMART CITY AGENDA

Nairobi's Smart City agenda has its origins in the Kenya Vision 2030 whose mission is 'to create a competitive and prosperous nation with a high quality of life by 2030'. The vision acts as a beacon to guide Kenya's transformation into a newly industrialised middle-income country, and hopes to achieve this by strengthening its social, economic, political and environmental policies (Kenya Vision, 2030).

The objectives of the agenda can be grouped into four main categories: firstly, to develop and promote an ecosystem for technological innovation, secondly, to create and market Kenya as an investment hub for multinationals (foreign investors), thirdly, to improve the quality of life of residents and fourthly, to integrate all government and other key sectors of the city. The Smart City agenda is designed to help achieve all four objectives in a concerted way using technological solutions.

The first cluster was developed out of the understanding that Kenya, with a strong belief in the country's potential, is rising from past economic turmoil. According to the Ministry of Information Communication and Technology of Kenya (2014), the main objective for establishing Konza City is to generate 17,000 jobs by the end of 2018, have 200,000 residents at the end of 2030 and contribute to the growth of the

country's GDP by 10% annually. The city is expected to deliver to businesses standard commercial office complexes, mixed-use lifestyle centres and leisure parks. The aim for Konza is to create a world-class ecosystem that supports a knowledge or creative economy. A respondent said 'One was to achieve an environment, an ecosystem that would be able to attract multinationals in the IT business' (R20N - University).

The hope is that this will provide and sustain incubation for an ICT industry in terms of technological innovation, as a respondent said 'The main reason was to create a new economic driver for this country' (R14N - Government). Another added that 'the underlying objective is to build a proper ecosystem for ICT' (R18N - Government) to support the following manufacturing, business process outsourcing (BPO), ICT-enabled services (ITES), create an investment friendly environment that would support incubation for knowledge processing by attracting the best educated and most skilled creative knowledge workers in Kenya, Africa and the world.

The rationale is that if Nairobi is to compete on a global scale and remain as Kenya's main economic hub, deliberate investments in infrastructure, policy development and leadership initiatives ought to be pursued to create an environment conducive to the support of technological innovation and to promote a business environment that contributes to economic growth.

Although Nairobi's economic focus is broader, the city's ultimate objective reflected in the programs implemented prioritises the quality of life of its citizens and residents. This is particularly important for the city because a strengthened economic environment and the availability of infrastructure positions both empowered and the less empowered citizen for job and employment opportunities, access to improved services and connectedness to global markets. These measures assist in ensuring that the quality of life of citizens is improved.

The Nairobi County region has been strategically earmarked for its role as an economic, political and administrative centre, however, it could take the city far too long to attain the objectives of a Smart City agenda centrally in Nairobi. This is because investing in a legacy city like Nairobi has proved problematic before. Previous planning of the city had not made provision for advancements in

technological integration in such areas as roads, water, power, waste management and other city services. Divisions of the city such as the departments of water, power, land and others still operate as independent departments; as a result, efforts are duplicated into silo structures. As populations have increased, so have inefficient and ineffective processes.

Firstly, efforts made previously to integrate these departments have caused too much disruption within the city with power, water, sewage, road networks and others. One respondent noted:

In Nairobi we are making lots of efforts to improve it with the new development in ICT solutions e.g. fibre connectivity to buildings and housing, but you find that to avail such services you have to interrupt existing services; you have to cut our roads and it affects other existing infrastructure whether it's water, power or sewer (R21N - Citizen).

This situation has resulted in higher costs and affected project outcomes and timelines.

Secondly, starting anew in a completely new area within Nairobi County makes financial sense and would make possible futuristic planning for the most modern infrastructure:

Konza provides that greenfield that we can model provision of such services from the design and from the first time make it right so that all those provisions for such services in future can be factored (R23N - Government).

The expectation is that Konza will be built to operate in such a way that all infrastructural amenities will be supported by an IT platform to integrate government, private sector and other stakeholders. This benefits the city by getting rid of disparate processes and systems operating as disintegrated systems. The rationale is that this will be achieved by incorporating data science and supporting technological innovations.

Interestingly, the objectives for Nairobi may be seen to prioritise the needs of stakeholders differently. Creating an ecosystem for tech innovation and promoting foreign investment appear to address the interests of foreign businesses first as well as the better educated residents who are likely to gain employment in these sectors. Cape Town and Nairobi's inclusive programs are emphasised differently, Cape Town is much more explicit about their social inclusion programs of the agenda, while Nairobi is much more explicit about the economic inclusion agenda. It is not that Nairobi is ignoring their citizens socially. It may be because economic pressures are more urgent issues in Nairobi while Cape Town's social issues arising out of apartheid are still prevalent. The needs of government are addressed in the fourth group of objectives.

5.5 ANTICIPATED BENEFITS OF SMART CITY AGENDAS

The anticipated benefits for Cape Town and Nairobi's Smart City agendas can be categorised into social, economic, environmental and infrastructure development. These link with findings in literature of the reported benefits for adopting Smart City agendas (Angelopulo & Hedrick-Wong, 2013; Datta, 2015; Ojo et al., 2014). Similar themes emerged from city documents as well as from respondents in the two cities. Table 9 compares the benefits across the two cities according to these categories. The anticipated benefits are very similar in the categories of social and economic with slightly different expectations.

Table 9: Anticipated benefits of Smart City Agendas for Cape Town and Nairobi

Category	1.1. Cape Town	1.2. Nairobi
Economic	Economic growth Job opportunities Contribution to GDP Economic competitiveness Increased foreign direct investments Innovation and entrepreneurship	Economic growth Job opportunities Contribution to GDP Economic competitiveness Increased foreign direct investments Innovation and entrepreneurship Tax exemptions on trade
Technological	Integrated information systems Increased digital educational opportunities (skills development and innovation) Lowered operating costs for city administration Improved productivity and services using technology	Integrated information systems Increased digital educational opportunities (skills development and innovation) Lower operating costs Improved productivity and services using technology
Social	Digital connectedness and inclusion Partnerships and collaboration Increased safety and security Improved public services (health, education, transportation)	Digital connectedness and inclusion Partnerships and collaboration Increased safety and security (curbing terrorism) Improved public services (health, education, transportation) Innovation in entertainment (film and music industry)
Political	Transparent governance systems and processes (e-government, procurement and transparency)	Transparent governance systems and processes (e-government, procurement and transparency)
Environmental	Sustainable management of natural resources (green buildings, renewable energy, water, smart utilities, waste management, disaster management) Better city planning and management	Sustainable management of natural resources (green buildings, renewable energy, water, smart utilities, waste management, disaster management) Better city planning and management

5.6 TARGETED BENEFICIARIES OF SMART CITY AGENDAS

In comparing Cape Town and Nairobi, there are commonalities regarding the stakeholders that are targeted as beneficiaries of the Smart City agendas. Interviews with various stakeholders from Cape Town and Nairobi revealed three similar categories of the beneficiaries. These are: citizens, government and businesses. These will be discussed in detail below.

5.6.1 Citizens

Several studies report that Smart City initiatives have the potential to deliver multiple benefits across various stakeholder groups. But the underlying question is what value do they add and who benefits from a city's wide transformation program? Findings of this research between Cape Town and Nairobi reveal that ultimately, Smart City initiatives are designed to improve the quality of life of residents and citizens. How that is approached is dependent on each city's areas of priority such as education, health, services or transportation.

Some respondents in Cape Town said

A lot of the emphasis of what Cape Town does is that if we can make the citizens of Cape Town happy and prosperous, then the other stuff will show up (R1CT - Government).

The beneficiaries around this is going to be the people, the citizens, the residents, ratepayers because some people are not ratepayers; the customer of the city that uses our facilities, those are our beneficiaries (R10CT - Government).

In Nairobi, this is how residents believe the Smart city agenda will benefit them as citizens:

Any growth in our city trickles down to every citizen because it's part of the economic growth of the country. When the income of the country grows, the livelihoods and cost of living goes down (R21N - Citizen).

In effect, these two cities believe that these agendas will improve the quality of life for the wider citizenry socially and economically and the opportunities cover a broad range of issues, in which they take an active role. The benefits derived from these agendas such as the inclusive programs seem to be designed to benefit all stakeholders but specifically poorer citizens or those considered socially and economically excluded.

5.6.2 Government

The shift from the traditional role of government and governance models is being propelled by technological advancements that have penetrated all city social services. Often local government agencies are designed to operate independently, but the introduction of technology is enabling government to centralise operations and functions, among other responsibilities. Because technology is considered an enabler of Smart City programmes, four key areas in which government benefits from the use of ICT are: creating transparency; inclusive decision-making; redefining processes and services; and collaboration (Mckinsey, 2012). A respondent in Cape Town said: 'a lot of it is around good government practices, they want to make sure it's corrupt free' (*R1CT - Government*). Another respondent expressed the role and benefit to government as a stakeholder in this way:

Our benefit as government is to make sure we get the outcomes out.

The most important part is to make sure we make the city financially sustainable to provide service delivery (*R6CT - Government*).

However, specific areas in which Smart City initiatives are expected to benefit government is dependent on which of these is a priority. This is not automatic because government leaders play a significant role in ensuring that priorities are rearranged to devote resources, time and a strong vision to develop cities that are liveable and sustainable. In terms of government, the assumption is that what benefits government ends up benefiting the general public, citizens and businesses, based on its responsibility of serving cities and the country.

5.6.3 Businesses

Technological advancements have made great and rapid shifts on businesses in nearly all sectors and industries. The Smart City agendas that city governments pursue often result in collaboration and partnerships between business and government. The idea is to share responsibilities for resources and innovative solutions that would lead to environments that support investments in infrastructure, services and innovation. In doing so, businesses are often empowered through policies, new economic models and regulatory strategies that support growth. Growth and advancement in business often result in job creation and more business

opportunities. Businesses benefit from Smart City initiatives such as: policies that support relaxed trade rules and regulations and tax exemptions on certain trade and investment initiatives. This in turn is likely to attract and retain a skilled work force and capitalise on talent critical to shifting business needs and dynamics. In Nairobi, there is a desire to empower and support entrepreneurship in technological innovation. A large number of these tech entrepreneurs are young graduates and the government is trying to provide job opportunities as well as encourage innovative business ideas. A respondent said: 'The young start-ups in business would benefit, because they will afford offices here, which will create an ecosystem for collaboration' (R14N - Government).

5.6.4 Other

Although findings suggest that the direct beneficiaries of the Smart City agendas are citizens, government and businesses, there are other groups which are also targeted, based on each city's unique or contextual positioning. Nairobi makes special mention of several other stakeholders as beneficiaries including traders, expatriates, investors, visitors and tourists. A respondent said

In Konza, we want to attract multinationals in the IT business to hold their global operations in Kenya, as an excellent place to live and work for the expected expatriates who will come to this city (R21N - Citizen).

While Cape Town mentions that these initiatives are directly targeted at citizens and businesses, other groups were also mentioned. These are tourists, foreign investors, and visitors; as one respondent said

We can't just try play to one audience, so what we need to understand is who is Cape Town? Cape Town is business; Cape Town is citizens; Cape Town is about tourists, but you need to keep everybody happy. We can't just focus on tourists for instance, because then it's going to create other social problems (R1CT - Government).

In Africa, Cape Town and Nairobi are tourist destinations and receive local and international visitors on diverse missions. Each city has unique natural features that attract visitors and ultimately generate a substantial amount of revenue from both domestic and international tourism. Here is what a respondent in Cape Town said: 'Cape Town has a lot of foreign property owners and provides a nice getaway from European winter, you find a lot of those who live in Cape Town are foreigners' (R1CT - Government). Part of what is being prioritised on these Smart City agendas is to grow and boost the tourism industry in the two cities. Unfortunately, the tourism industry in Kenya, particularly Nairobi, has been affected by terrorist attacks. However, the city has, and is continuously putting in, measures to prioritise safety and security for residents as well as tourists as highlighted in section 4.5.

Besides having similarities in the directly targeted beneficiaries between these two African cities, Nairobi appears to have a large group of expatriates who are perhaps present in Cape Town but less noticeable. This could be attributed to the structure of South African cities where not all economic, political and administrative activities are concentrated in the capital city as they are in Nairobi. Currently, Nairobi has a combination of isolated small-scale Smart City initiatives within the inner city as well as a number of large-scale city wide projects such as Konza Techno City. Small-scale projects within the inner city include some residential areas such as Upper Hill. Upper Hill is located 4 km away from the central business district (CBD) of Nairobi and houses several international landmarks such as the World Bank offices, African Development Bank, British High Commissioner, International Finance Corporation amongst others.

The area evidently boasts a modern-looking infrastructure with an atmosphere of open green parks and networks fitted with Smart City features. Such efforts are in line with the stated aims in the NMR 2030 whose intention is to 'pursue a world-class working environment by delivering a unique image and identity through effective place branding'. A government official during the interviews said

Nairobi has been able to attract various people. We have the UN entities here, diplomats; Nairobi is already a financial centre in the region and so it's also able to attract multinationals to hold their

global operations in Kenya; there have to be facilities and buildings that can meet their expectations and standards (R21N - Citizen).

The preference and priority given to such areas is due to a large presence of international expatriates as a result of Kenya's role in the region as host to international agencies. Areas such as Upper Hill and others are being transformed into commercial areas from residential use, firstly, to move official and business activities away from the significantly overcrowded city centre and secondly, to allow for technological integration into the newly refurbished modern buildings with features like utility and connectivity infrastructure. An official in Nairobi said

We needed Smart buildings which we didn't have; actually this is what necessitated the idea. Because when the American investors were here, they were asking for things like fire extinguishers, water sprinklers and everybody would say, 'What are they talking about?' (R14N - Government).

Besides the named beneficiaries, there is also an expectation that Nairobi's Smart City agenda will benefit cities and other countries in the East African region in trade relations and tax regulations. The goal is to encourage a better trading environment which may result in job and employment opportunities. This was expressed as follows:

A Smart City lays a foundation as a market and way of creating good relationship between Kenya and other countries, so in other words we are talking about job creation and open markets where Kenyans can trade and exchange ideas and goods (R16N - University).

On a broader level, a city's efforts in transitioning towards a world-class African city are linked to the city's integrated development plan. These represent the city's economic, social, political and environmental advancement for developmental purposes. Practically, the city's vision of broadening access to high-quality public services for its citizens aligns with the adoption of ICT infrastructure, required to facilitate digitally connected living. The agenda has been set and continues to using

mechanisms and channels for inclusion, empowerment and participation for citizens and other stakeholders with the aim of improving quality of life.

5.7 CHAPTER CONCLUSIONS

This chapter set out to answer the question: What are the objectives for the Smart City agendas of Cape Town and Nairobi? The chapter presented how Cape Town and Nairobi define a Smart City, the objectives for setting the agendas with the aim of determining what the anticipated benefits are and who the targeted beneficiaries are of these agendas.

The concept of a Smart City is still in its early stages within the African context in meaning and applicability. But, using the context of Cape and Nairobi, the definitions of a Smart City in Africa revealed five themes including technology, connectivity and interaction, modernity and innovation, service delivery, and sustainability. While many of these are common to the two cities, in Cape Town, the idea of improved services delivery, connecting and interacting are emphasised, while the focus in Nairobi is on technology, modernity and innovation, and sustainability.

Between Cape Town and Nairobi, the idea of transitioning towards a Smart City is associated with the pursuit of a world-class image and has links to the broader city and national developmental plans being the Integrated Development Plan for Cape Town and the Kenya Vision 2030 for Nairobi.

The objectives for the Smart City agendas in Cape Town are driven by the country's history of inequality and focuses on improving city management (citizen access, connectedness), and supporting economic growth. These objectives are guided by the city's desire to be an opportunity city, safe city, caring city, inclusive city and a well-run city. In Nairobi, the objectives relate to the Kenya Vision 2030 and have a particular focus on marketing Kenya as an ICT innovations hub and on attracting foreign investment through modern infrastructure, economic growth and sustainability concepts.

The anticipated benefits of these Smart City agendas are classified into the categories of economic, technological, social, and environmental and these are common to both cities without much difference in terms of what and how they expect

to benefit from the agendas. This study did not find differences in terms of the anticipated benefits as well as the intended beneficiaries of these Smart City agendas. Between Cape Town and Nairobi, citizens, businesses and government are the primary stakeholders and the intended beneficiaries of the agendas. However, there are other indirect beneficiaries such as tourists, visitors and, particularly for Nairobi, expatriates due to their large presence in the city.

CHAPTER SIX: MODELS AND APPROACHES USED IN SETTING SMART CITY AGENDAS

6.1 INTRODUCTION

The adoption of Smart City agendas is often a complex process and requires involvement from multi-stakeholder groups over a long time horizon. These range from sponsors, legal experts, funders, investors, environmentalists to social groups like clubs, government agencies and residents. The City of Cape Town and Nairobi have adopted Smart City agendas, but the ways in which these agendas have been adopted and implemented are different. These differences can be linked to factors specific to each city's contextual conditions and these include: leadership styles, governance structures, socioeconomic status, size and scale of projects and objectives/priorities of the agendas. This chapter will be presented in the following order: models and approaches adopted by Cape Town and Nairobi in developing the Smart City agendas; the roles and responsibilities of the stakeholders, including the processes and mechanisms employed; and the challenges to the adoption of the agendas.

6.2 MODELS AND APPROACHES TO SMART CITY DEVELOPMENT

The cities of Cape Town and Nairobi have developed Smart City agendas, but the ways in which the agendas have been developed are different. Below is a discussion on what emerged from data of how these cities developed their agendas and the process. The next section discusses the approach taken by each city.

6.2.1 Cape Town's approach

Cape Town appears to have adopted the bottom-up approach and applied the process method to transitioning towards a Smart City. This point was explicitly made by city officials who said that:

It's definitely not top-down. It's bottom-up (R10CT - Government).

Ours is very much the bottom-up approach and we pride ourselves in pursuing our own strategy and not having a vendor-led strategy (R1CT - Government).

Officials said the approach chosen is bottom-up and they have electronic mechanisms for citizens to engage in participatory governance: ‘the conversation and the platforms are there to dialogue, to engage in dialogue’ (R4CT - Government).

Although the predominant approach is bottom-up, the Smart City agenda was an internal initiative within the organisation by the leadership who said that:

It’s not the citizens, they haven’t said this is what we wanted to do, it’s actually the administration and specifically IT and the leadership. It’s been probably three people in the IT leadership, the CIO in fulfilling their role as the leadership that have said, this is our definition of a Smart City and this is what we’re going to do and that’s very important in our story (R10CT - Government).

This is not unexpected, given that a large part of the Smart City agenda focuses on improving the functioning of the city as a service provider. Although the Smart City agenda was an internal initiative, the city understood that it impacts stakeholders of the city, such as residents and businesses. As a result, processes were put in place to facilitate consultations and to encourage participation from stakeholders in terms of those who are interested, impacted and responsible (R1CT). The intention was to incite interest and support, and ensure that the value derived from the proposition benefits these stakeholders.

However, although most respondents said it is bottom-up, some indicated the complexity of the approach and that it is not always simple to distinguish between the two approaches. Respondents said

We have a challenge matching the bottom-up and top-down approaches because we are dealing with a lot of very innovative players and to make sure that we can communicate what the city needs to solve problems (R7CT – Government).

The city hasn't always been good at putting their problems out to the world, we kind of almost try to solve it internally before we present it (R7CT - Government).

In addition to consultations with stakeholders over solutions to challenges, the city also consults with businesses and private technology companies to assist in identifying solutions relevant to the articulated problems and opportunities. Respondents explained that:

Even though Cape Town has taken this approach, we still consult with private technology companies. It's only once you have articulated the problem, once you understand what the problem is you cannot find the solutions for yourselves, and so we still consult with technology companies" (R1CT- Government).

We need to get better at pulling muscle memory around being able to articulate challenges that we feel we can solve in a smarter way and engage innovative companies (R7CT - Government).

It appears that Cape Town has adopted the bottom-up process approach to the development and implementation of the Smart City agenda. The agenda is centrally driven with most decisions made internally by leadership. However, consultations with stakeholders are still conducted. There is evidence of consultation and participation from various stakeholders through media reports, and also through other channels designed specifically for participation. Examples of systems put in place for participation includes the C3 notification system of 2007 and the citizen portal of 2008 (details of the platforms are described in chapter five). Although the approach is predominately bottom-up, the city still involves technology companies for input and expert solutions that at times draw on top-down principles and procedures.

6.2.2 Nairobi's approach

In Nairobi, there is evidence that the master plan and the implementation method of the city is top-down, specifically for Konza City. But there is also evidence of consultations in the development of the agenda, as reflected in the NUIPLAN. These

are in the form of workshops, seminars, public meetings and staffed exhibitions used as communication platforms between various government agencies and other stakeholders. An official noted by saying 'we used forums like conferences, workshops and also engage through online and face to face meetings' (R23N-Government). There appears to be a fair representation of stakeholders in these consultative platforms.

A review and analysis of a consultative workshop on outcomes specific to the Smart City agenda hosted by IBM (2012), records the attendance and participation of stakeholders according to the categorisation provided in stakeholder theory as responsible, impacted and interested stakeholders, namely the private sector, residents, and local and international business (IBM Report, 2012).

However, although there have been consultative processes for the development of the agenda, government officials in Nairobi explicitly noted that the implementation process is a top-down approach for the Konza City project because 'you don't have no democracy in such a huge thing, you plan it and you do everything and go (R21N - Government)'. The official noted that although a feasibility study and consultations were conducted initially, only so much could be done to a certain point and due to the time sensitivity of such projects, not everyone can be accommodated on final decisions. Another local authority expressed it this way:

If you start asking that question, you wouldn't do anything, they can either sell the land or build something based on the requirements. You can't accommodate everybody (R14N - Government).

Officials say that reaching consensus for decisions can take time and too much effort because of the challenge of having to consult with the many stakeholders for a project of this scale and magnitude. This point is also made by Watson (2014) who notes that in many African countries, planning systems are mostly top-down and largely undemocratic due to pressure and a sense of urgency. In this way, decisions that impact citizens are made and ultimately do not reflect the views and interests of stakeholders that are impacted by the final decisions.

In the case of Konza City specifically, there was no direct consultation with the impacted stakeholders, such as local residents, because of the nature and structures around the project. Konza is situated in an area that has a local area chief who represents residents in matters that affect them. Because of this structure, the majority of consultations and communication about the new city project is conducted through the chief. The chief then communicates directly with residents pertaining to area matters which is not necessarily a bad thing, although it is not direct consultation. In my conversation with the chief, it appeared that the chief is very well-informed about the Konza project.

This was confirmed in conversations with residents in the area who revealed that there is an awareness of the new city project in Konza. To them, the new city is more about job opportunities. A resident said 'they have created employment and they also want to employ people from other counties' (R17N - Resident). It seems as though residents are well aware of the Konza City project, but were not directly consulted in developing the agenda. However, development agencies suggest that the methods of Smart City adoption and planning could vary, depending on the plan and contents of the agenda (United Nations, 2016). The rationale is that cities could use new platforms and strategies to gather opinions from different stakeholders and integrate them into initiatives and plans. One of these suggested platforms is open innovation.

On the other hand, when it comes to the legacy city of Nairobi, upgrades are being phased in using a bottom-up process approach (R14N - Government). These improvements and upgrades being made are through the local municipality. However, some of the stakeholder initiatives, especially those concerning safety and security, appear to be initiated and owned by residents in a bottom-up, ownership manner. Some of these initiatives are managed and organized by the residents themselves. In these initiatives, the residents act both as the responsible and impacted stakeholder.

Hence in Nairobi, all three different approaches to the development of the Smart City are observed. For Konza specifically, the top-down approach seems necessary because it is a green-fields project. An official explained that the key difference

between Konza and the other cities is that “this is a master-planned city, planned from green-field, which means no one is to be relocated” (R21N - Citizen).

The indication was that, because this city is being built from scratch with no occupants on the land, there was no need for consultation. The researcher also observed bottom-up approaches, both of process and ownership varieties (R21N - Citizen).

6.2.3 Comparison

Although the cities of Cape Town and Nairobi share similar objectives and priorities in their Smart City agendas, the approaches to development and implementation of the agendas are different. This difference reflects the differences in the kind and types of projects being undertaken as well as the structures established for implementation. While Cape Town has adopted and implemented the agenda through its local government structures, predominately using a bottom-up approach, Nairobi on the other hand, established a formal body under the Ministry of Information and Communication of the government of Kenya, called KODTA. The sole mandate of this body is to project manage the Konza City project and oversee all phases of the project from conception to implementation. The size and scale of the agendas and projects undertaken are also not the same, although they share similar objectives and priorities. The difference is that Cape Town’s agenda focuses more on service delivery and mobility and is doing so incrementally. Nairobi’s agenda involves large-scale physical and ICT infrastructure projects, partly developed and implemented through a top-down approach specifically for Konza City, while a bottom-up approach can be observed in the improvements and upgrades being made to the legacy city.

6.3 ROLE OF STAKEHOLDERS AND PUBLIC-PRIVATE PARTNERSHIPS IN SMART CITY AGENDAS

Stakeholder theory was applied to provide insight into the types of stakeholder relationships and the ways in which stakeholders are involved in the planning and development of a Smart City agenda. The theoretical lens provided understanding of the ways in which the Smart City agendas of Cape Town and Nairobi have been adopted, including who is involved, what role they play, their responsibilities and what processes and mechanisms are employed in engaging stakeholders.

6.3.1 Stakeholders

This research adopted the stakeholder classification and the associated attributes of El-gohary et al. (2006), who provide insight into the types of stakeholder groups as well as the roles and responsibilities associated with each stakeholder group. El-gohary et al. (2006) identify the three categories of stakeholders: responsible, impacted and interested.

Stakeholder relations are reported as one of the critical factors that determine the success or failure of some public projects (Scholl et al., 2009). According to Chourabi et al. (2012) stakeholder relations are linked to four factors which are: ability to co-operate among stakeholders; support of leadership; structure of alliances; and stakeholder management processes. In the cases of Cape Town and Nairobi, the current Smart City agendas have an array of stakeholders from the categories of responsible, impacted and interested, from both public and private sectors. The categories include government, businesses, multinational corporations, IT companies, engineers, consultants, citizens, investors, aid organisations, social groups, environmentalists, expatriates, academia, think-tanks, NGOs, media, legal experts and regulatory bodies. Each of these stakeholders has a role and responsibility towards the development of the agenda. However, the primary roles are between government and the partnerships formed for the achievement of the agenda. These will be discussed in detail in the section that follows.

6.3.2 Roles and Responsibilities

6.3.2.1 *Government*

In most African countries, government agencies are mandated to deliver services, enforce the law and regulations and other responsibilities. Odendaal (2006) points out that local government is often mandated to deliver on social and economic developmental goals as well as pulling together the many resources in pursuance of overall city development. This is for the following reasons (Odendaal, 2003):

- An increasingly developmental role for local government has stretched beyond the traditional role of service provision, which extends to social and economic development. This opens up municipalities to the challenge of being more proactive and innovative.

- There is a trend towards creating a promotional identity for a city, using unique or outstanding characteristics in portraying a city's image, often with the intent of attracting investment and visitors.
- There is an emphasis on networks and collaboration between city government, municipalities and other institutions, i.e. promotion of public/private partnerships and other stakeholder groups in the city.
- There is a move towards 'joined up' local government, in terms of administration towards service delivery and integration across departments away from the silo-sector approach.

According to officials in Nairobi, the role of government in the Smart City agenda is not limited to funding; it is also to ensure the regulatory environment is conducive for non-governmental stakeholders. The purpose is to promote transparency to: engage, contribute, support and ensure participatory ownership from all stakeholders (R21N). This role includes formulation of strategic and regulatory policies and licensing that support trade, investment, entrepreneurship, financial fluidity and infrastructure development. A government official emphasised this point on regulation. He said 'it is important that government creates a regulatory environment' (R23N - Government).

The Kenyan government has formulated and implemented policies that support the 2030 vision as a long-term development strategy. Most of these policies are either new or existing policies reviewed or revised to align with the 2030 vision. These were developed through an inclusive and consultative participatory stakeholder process using workshops, seminars, expos, feasibility studies and media such as newspapers, radio and television, as well as social media such as Facebook and Twitter. Examples of such policies and frameworks include:

- Kenya National Constitution of 2010;
- Kenya Land Control Act of 2010 (a revised edition of the 1989 Act);
- Securities Laws Amendment Act, 2014 (amends 21 different laws of public order Act, penal code, evidence Act, criminal procedure code, extradition Act, prevention of terrorism Act, national police services Act and national services Act);

- Special Economic Zones Bill of 2015 (promotion and facilitation of global and local investment; the development and management of enabling the environment for such investments and connected purposes);
- Financial Bill of 2015 (provides incentives for development of ICT parks and matters relating to finance);
- The Science, Technology and Innovation Act of 2013 (facilitates the promotion, coordination and regulation of the progress of science, technology and innovation; assigns priority to the development of science, technology and innovation for connected purposes);
- The 2006 National ICT Policy framework (deals with convergence, ICT in health and education, e-commerce, e-governance, privacy and cybercrimes).

Another role of government in the Smart City agendas was indicated by some respondents who said that:

Government's role is purely provision of basic infrastructure and public services (R17N - Citizen)

Government was to invest in infrastructure horizontally and the industry to come and put up verticals; it's not so much that the government was going to invest but just to make sure there is water, sewerage, power and broadband and all the basic infrastructure (R15N - Government).

Respondents also broke down the roles between government and the private sector saying that "Government is to provide basic services for service delivery but the development is envisioned to be done by the private sector" (R14N - University). Another respondent noted the role of the university emphasising other governmental responsibilities in terms of contributions towards research in the sciences and technology sector. The respondent said "Two years ago, we enacted what is called science, technology and innovation act (STI) 2012 which articulates what the university should do in terms of technology and innovation, what the government

should do, what private sector should do, and how much money the government will put in spurring such kind of initiatives that science and technology which also took government to direct 2% of GDP towards research and innovation” (R16N – University). This dual role between government and the private sector through partnerships leads us into the discussion on partnerships and the role they play in Smart City agendas.

6.3.2.2 *Partnerships*

Public-private partnerships (PPPs) have become relevant and important within the African context due to Africa’s growing need for infrastructure development, especially in areas of transportation, service delivery and telecommunication networks (Dykes & Jones, 2016). The United Nations defines partnerships as ‘voluntary relationships between various parties, both state and non-state, in which all participants agree to work together to achieve a common purpose or undertake a specific task and share risks and responsibilities, resources and benefits’ (UN in Martens, 2007, p. 10).

Cape Town and Nairobi pointed out the relevance of forming partnerships between public and private sectors concerning the Smart City agenda, they related that these partnerships play a major role towards the success of these public-related projects. Cape Town mentioned that, it is the responsibility of government to define and articulate a vision and then source those that can support it, such as business and others. One respondent made this point as: ‘I think that something that governments can do that sectors can’t always do is articulate the common vision and people can figure out their contribution to support the vision’ (R7CT - Government).

Others, according to a respondents’ view within the city’s municipal structure could also mean ordinary residents who own property or a service provider doing business with the city. He said ‘a business partner, we define as who is the owner of the service or the service provider and not necessarily a business partner, it can also be a staff member” (R8CT- Government).

However, on a broader level, in order to support the Smart City vision and accelerate advancement in digital skills and resources, the city has partnered with a number of big corporates from private sector such as: Accelerate Cape, Silicon Cape, SAP,

Microsoft, Capacity and others. Primarily for the crucial role they play in the area of digital and ICT skills development. These companies offer products and services needed and required by the city to advance their agenda. A respondent said:

Capacity is the key one to look at. They drive most of the skills development initiatives. At some point the industry told us that they require more people that can use Java and that can use particular coding languages (R7CT - Government).

Some of the partnerships formed are not necessarily for funds but for support in terms of skills, best practices and these operate in the form of business forums. The role is to assist the city in identifying in which areas skills and resource gaps are more prevalent. A respondent said “we have Accelerate Cape, which is essentially like a business forum and hosted our workshops, at some point, the industry told us that they require more people that can use Java and other coding languages” (R9CT- Government).

Similarly, Nairobi has formed partnerships with various stakeholders for the definition, development and implementation of the agenda. These include organisations such as Cisco, Huawei, IBM, Tata, UN-habitat, UN agencies, Craft Silicon, KEPSA, local businesses and investors, research institutions, universities and other government agencies. These relationships are formed as a way of sharing responsibility, skills development and transfer, expert and intelligent solutions, accountability, funds and sponsorship. An official put it this way:

There have been a number of partners that we have engaged. Initially for master development there was a custodian led by the International Finance Corporation through which a master plan was developed. After that another consortium was engaged called Master Development Partner 2 (MDP2) whose mandate is to give us guidelines and project management services. It is led by an American company called TetraTech, other consultancies for design of various service utilities and developments within the city. The consortium includes CISCO (R23N - Government).

Another interview respondent noted the relationships and interests from other partners such as research institutions and said “we had 2 international universities that are globally known for IT doing research production and they wanted to do their research production. It was to also help our local universities to understand that research production ends up as research products that are implemented” (R13N-University).

These partnerships are not entirely for the Smart City agenda; they are intended for the overall achievement of the Kenya 2030 Vision.

While there is much commonality between Cape Town and Nairobi’s agendas, relationships formed between government and other stakeholders, represented as responsible, impacted and interested, serve different purposes at different stages of the agendas.

The needs, responsibilities and value of the partnerships for Cape Town’s agenda relate to advancing digital skills and resources internal to the organisation for implementation of the initiatives, while Nairobi is requiring skills in ICT for defining and conceptualising the agenda. An official noted that, they are still inquiring on fundamental principles thus “we participate in entities and forums involved with Smart Cities like last year we went to King Abdulla Economic City were they discussed Smart Cities requirements” (R23N - Government.). Nairobi is in need of funding, expertise for formulation and definitions, and processes and mechanisms for management of the agenda.

However, gaining insight into the types and value of the partnerships formed for driving the Smart City agendas for Cape Town and Nairobi provides understanding into why these partnerships are formed. The section below is a discussion into the sort of funding models available and the value of these partnerships particularly for the Smart City agendas.

6.3.2.3 *Funding models and value of partnerships*

Funding and costs emerge as critical enablers for successful implementation of the Smart City agendas. The value of and relevance of partnerships on large-scale infrastructure projects is pointed out by Dykes and Jones (2016) who propose that

partnerships are formed because government and the private sector can work together to develop valuable public assets that would be too risky to develop alone:

- Partnerships offer government the opportunity to gain infrastructure funding due to the scarcity of public funds to finance infrastructure projects.
- Partnerships provide a way of minimising the government's capital investment and avoid limitations to capital market access; and counter government operating inefficiencies reflected in the form of bureaucratic policies and procedures.
- Partnerships are beneficial for other stakeholders, for example, international funding agencies such as the International Finance Corporation (IFC), African Development Bank (ADB), World Bank and the United Nations among others (Dykes & Jones, 2016).

The involvement of multinational corporations offers the opportunity to extend the company's foreign direct investment (FDI) and allow for alliances and joint ventures. In doing so, partnerships allow multinationals to develop direct relationships with government agencies and such relationships are at times critical to the success of complex infrastructure projects.

The cities of Cape Town and Nairobi have both designed funding models because these are factors critical to the successful implementation of their agendas. In Cape Town, respondents indicated that the city funds most of the projects from its internal revenue streams. One said 'the city is funding itself, as part of its normal capital investment so the city uses its own revenue streams to fund the initiatives' (R1CT - Government). Others also reiterated the point by breaking down how much each stakeholder funds. For Cape Town, because government is the sole initiator of the agenda, it is considered their responsibility and so, government funds 90% of the agenda. A respondent said:

External funding that we get is principally from national government, that's grants and then in very small areas that investors would come in and make donations. As I recall, I mean it's less than five percent of our total income stream, so it is self-funded (R10CT - Government).

Nairobi's Smart City agenda is larger in scale and size, as a result, the funding model is more complex due to the mix of sponsors. There are some projects that are private sector undertakings while others are government projects, such as Konza City. The mixture is also indicative of the partnerships formed at the various stages of the agenda as work around the agenda is being implemented. Respondents indicated that a good portion of funding is from government:

We've continued to receive funding from the government to finance our operations and development. To date, we don't have issues which we can say there is this initiative that we have failed to do because of funds though we really need quite significant funding. We are in discussions with government treasuries and other agencies to see how we can do major developments of horizontal infrastructure i.e. roads, utility provisions, waste water treatment and so on (R23N - Government).

In the case of the Konza City project, the actual breakdown of who is funding what percentage of the agenda is not explicit, however, the project document records that:

The cost of undertaking Streetscape and sub-surface utilities infrastructure development at Konza Techno City Phase 1 is estimated at approximately 64 billion Kenyan shillings, \$640 Million USD (EPCF Document, 2016).

Funding for the agenda of Cape Town and of Nairobi seems to be from a mix of sources, both local and international funders, and include private sector, direct foreign investment, the government, as well as development agencies. This was more apparent in Nairobi where respondents commented that "funding for infrastructure like water was funded by African Development Bank, the main road from Konza city to Nairobi was to be built by the World Bank" (R14N - Government).

It emerges in both Cape Town and Nairobi that the major source of funding is government. The impression formed during interviews is a sense that partnerships are for staffing, skills, knowledge and expertise and more so for funding. However, the funding models are continuously redefined at the various stages of the agendas

to accommodate the relationships and derive value from partnerships for expertise and support, institutional collaboration and cost sharing. The dominant nature of the partnerships in both cities appears to be government-led and private-sector supported partnerships; meaning that a county government, city, municipality or a combination of these entities owns the project and works with private partners to construct, operate, and maintain the infrastructure in exchange for funds or in-kind support (Broadband USA, 2016).

6.3.3 Processes and mechanisms

Stakeholder engagement is a process of communicating with stakeholders to develop relationships based on common interests (Chinyio & Akintoye, 2008). Understanding the concepts that underlie stakeholder engagement in partnerships related to infrastructure projects is essential towards creating strong involvement. This is to help project owners and stakeholders to communicate effectively, to ensure cooperation among stakeholders and buy-in mutual support (El-Gohary et al., 2006). The concept refers to the process and the activities involved in the co-production of innovative urban services with social connections and relations that citizens develop within a Smart City (Paskaleva et al., 2015, in Bolivar, 2015).

For the purposes of Smart City projects, Cape Town and Nairobi have designed processes and mechanisms to engage various stakeholders for social, economic and relational engagements. There are numerous engagement methods available for public interaction and a lot of these options are technologically enabled. The ones that can be observed in Nairobi and Cape Town include open data, open innovation and other educational programmes like skills development. The section that follows will discuss open data, open innovation and skills development.

6.3.3.1 *Open data*

The increasing demand for open and transparent government processes is requiring municipalities to create interactive engagement processes for citizens and business (Gartner, 2016). Open-data platforms are one of these tools in Smart Cities. Research into open-data platforms indicates that making data accessible by design promotes a citizen-focused approach to city development (Gartner, 2016). For example, Cape Town is formulating open-data policy to allow technology entrepreneurs to build on the city's data and systems to foster and nurture innovative

digital solutions, promote transparency and encourage collaboration and participation towards city-related initiatives (Cape Town Digital Strategy, 2015).

Cape Town aims to develop public participation processes that optimise the use of digital channels to get input on city policies and initiatives by:

- Boosting the skills and capacity of the public participation unit to use web and mobile channels for public participation;
- Maximizing the use of social media like Facebook and Twitter as a public participation tool.

Much like the city of Cape Town, the Kenyan government launched an open-data policy in 2011 (Kenya Open Data.go.ke) though the scale of the initiative is broader and stretches nationwide. The Kenyan government states that the intention of the policy is to make it easier for government agencies, citizens, businesses and all related stakeholders to search for, find and compare data, improve efficiency and increase transparency and accountability between and amongst Kenyans (Kenya Open Data, 2013).

These views and principles on open-data platforms also reflect the literature. Masip-Bruin et al. (2013) and Janssen et al. (2012) argue that there are three common benefits behind open-data initiatives for Smart Cities. Firstly, open data makes government more transparent, participative and collaborative. Secondly, open data encourages public involvement in data collection, analysis and application, which demands accountability; in government, this can assist in reducing government spending or promote the use of efficient processes. Thirdly, open data has the potential to create new avenues of economic growth by promoting and stimulating innovative solutions through ICT. However, besides the reported benefits of open data, Degbelo et al. (2013) argue that there are issues and risks associated with open data that Smart Cities are likely to experience. These include: infringement of trade secret protection, violation of privacy, and breaches of infrastructure security. Irrespective of these potential risks, open-data platforms have become one way through which cities can create an environment of openness and transparency with stakeholders, as well as a means through which digital skills are developed inclusively.

6.3.3.2 *Open innovation*

Open innovation is a process of finding and using innovative ideas emerging from consumers as well as engineering an environment of collaboration not formally associated with the organisation. It is a process through which an organisation looks for solutions among a wide group of stakeholders (Anttiroiko, Bailey & Valkama, 2013). This idea stems from the belief that 'not all good ideas are developed within the organisation and not all ideas should necessarily be further developed within the organisation's boundaries' (Chesbrough, 2003: 68). Open innovation utilizes both internal and external ideas to create value and knowledge from internal processes with either input or ideas from external users or channels, such as customers, suppliers, vendors and others (Chesbrough, 2003).

The open innovation platform orientation is supported by Anttiroiko et al. (2013) who suggest that the platform encourages a move away from the stereotype of municipal government as heavily bureaucratic, characterised by silo-mentality, unresponsive, inflexible and lacking scope for productivity, which is reflective of a top-down approach to city development. It is an innovative way that governments can source specialist solutions from a pool of professional backgrounds as well as provide opportunities for selection of the best and most effective solutions.

The cities of Cape Town and Nairobi understand and acknowledge that innovation platforms are necessary for collaboration and also to keep up with the rate and pace of technological advancements in society today. In line with the Smart City agendas the open innovations approach has been adopted, based on the understanding that local government is not able to successfully pursue the Smart City image if collaborative efforts are not explored. This is for knowledge, resources, and experience from external sources (Fasnacht, 2009). As such, the City of Cape Town's Smart City strategy explores solutions through collaboration with other innovators. A respondent in Cape Town narrated how this is achieved:

There's been some small-scale initiatives, for instance in a particular area or around a particular theme, where, we'll get someone like the bandwidth-ban to host a hackathon of sorts where they would challenge a group of people to come up with an innovative solution (R7CT - Government).

These collaborative efforts are also supported by the availability of open data that allows external sources access to the organisation to gain insight into government challenges and design innovative solutions.

In Nairobi, the open innovation idea has been pursued in Kenya since the 2000s with the ideas in the financial services sector as well as the formal launch of the iHub platform 2010 (Venture Capital for Africa, 2016). The platform is an open space for start-up technology development to support and develop the growing number of digital entrepreneurs. These platforms align with the country vision of positioning Kenya as an ICT destination in Africa. Respondents expressed reasons for the adoption of open innovation ideas that:

Kenya is rising as an innovation country, which has led to the adoption and use of new technologies and platforms, namely M-pesa. We have a large number of people graduating from our universities with strong potential of rising in innovations (R16N - University).

The study found that mechanisms to explore solutions on open platforms are present in both Cape Town and Nairobi, although not approached in a similar manner. However, the idea of seeking for solutions external to the organisation, particularly for the Smart City agenda is observed in both cities. It seems that the aim to encourage and support collaborative mechanisms is to ensure skills, especially in the digital space, are developed at an accelerated pace to match the rapidly changing technological dynamics in cities. As such, Cape Town and Nairobi use this mechanism to advance developments of their Smart City agendas.

6.3.3.3 *Skills development*

Cities transforming into Smart Cities feel the need and urgency to change, modify and create educational material and inclusive programmes that are necessary to creating a Smart City. These programmes include skills in the digital space (Klett & Wang, 2014). The area of skills and digital literacy consists of three categories: digital training, tools and usage, and knowledge, which measure educational attainment with some indication of the quality of education provided (Siemens,

2017). Access to technology, information and educational opportunities in digital skills development is important in achieving a robust digitally connected living status for residents of African cities.

The attainment of a digital city such as Cape Town and Nairobi are pursuing, requires that citizens, businesses, social groups, and the private sector are empowered through development and provisioning of digital skills programs, digital tools and internet networks on which these programs are enabled. The two cities have digital plans in place and are in partnership with telecommunications service providers i.e., Safaricom for Nairobi and Neotel for Cape Town.

The strategic plans make reference to achieving this through improving capacities for learning, training and broader ICT skills education. They plan to grow digital literacy, enrich residents' information and knowledge bases, and provide platforms that promote innovation and access to the technology. The rationale is that such initiatives will play a catalytic role for addressing issues of economic and social exclusion that are still prevalent in society.

In Cape Town and Nairobi, there are three strategies set to realise these goals through partnerships. The aim is to accelerate the process in the following ways:

- i. Form partnerships with educational institutions to facilitate appropriate skills development, especially digital literacy;
- ii. Form partnerships with industry to drive sustained ICT adoption and implementation at local and national levels; and
- iii. Form partnerships with local communities to facilitate local access to information and technology services at subsidised rates.

Local government in Cape Town has explored various approaches and has formed partnerships with educational institutions in the digital space from both public and private sectors for skills development. The city government in Cape Town has partnered with Neotel and the Cape Digital Foundation which aims to connect all schools in the Western Cape region with broadband connectivity (Siemens, 2017). Respondents in Cape Town also said:

The city is funding training programmes for skills development and is finding it a very effective tool of both supporting the industry by ensuring the necessary skills are available and actually also creating job opportunities for unemployed youth, so it has been a very effective strategy. So we mainly use Accelerate Cape Town and Silicon Cape in the digital space (R6CT - Government).

We have also partnered with NGOs in terms of providing programmes and some of those NGOs have sponsored equipment (R8CT - Government).

Other ways to improve skills are through open data platforms to accommodate start-ups, encourage entrepreneurship, skills development and job creation (R8CT).

Similarly, Nairobi's agenda prioritises educational programmes in digital skills development to foster and advance technological knowledge and skills amongst citizens (Siemens, 2017). The Konza Technology City master plan includes building a new university with a specific focus on science and technology. However, because the project is still at a conceptual stage and the city is attempting this for the first time, the skills shortage and gap were mentioned. The city has strategically partnered with technology companies for their expertise and knowledge, indicating that

There have been a number of partners that we have engaged for skills. Initially for master development there was a custodian led by the International Finance Corporation (IFC) through which the master plan was developed (R23N - Government).

In addition, the agenda intends to formulate new policies and adjust educational programmes:

There have been a lot of discussions of change in the educational system to be more focused on skills development rather than academic qualifications and so we might be going through a huge

change in our key educational system to match the technology concept (R23N - Government).

Although the agendas of Cape Town and Nairobi are at different stages of conceptualisation and execution, the cities are exploring various processes and mechanisms through which to advance. These have been adopted to facilitate engagement, interaction and participation. At the centre of the most successful engagements with stakeholders is often the ability to communicate and engage in dialogue. Trust emerged as an important factor throughout these interactions. The issue of trust will be discussed in greater detail in the section that follows.

6.3.3.4 *Trust*

Interestingly, the data for Cape Town and Nairobi revealed a socio-cultural theme which had not been part of the pre-identified themes for this research. The emergent theme is trust. Literature reports that every profession and every institution needs trust. We need it because we have to rely on others acting as they say that they will (O'Neil, 2002). In social and relational matters, trust acts as a unifying agent (O'Neil, 2002). The key elements of trust are linked to competency, ability, honesty and reliability (Mahmood, 2006). Sociologists claim that we are in the grip of a deepening crisis of public trust where citizens no longer trust politicians, government ministers or police (Braithwaite & Levi, 1998).

In a similar discourse, the Development Bank of Southern Africa (2009) writes that trust in institutions is the second major component of overall social stability. Declining levels of trust in institutions is dangerous for both democracy and development (Fakir, 2009). Given the dynamics of institutional and governance responsibilities with which local government is mandated, trust is vitally important in managing the risks, complexities and challenges associated with the large number of stakeholders (Walravens & Ballon, 2013). The expectations of public office require leaders to lead for public interest; honesty in the execution of public duties; accountability to the public for decisions and actions; and discipline and commitment in service to the people. Often these duties require managing views, interests, expectations, implications, responsibilities, accountability and ownership (Fakir, 2009).

Respondents in Cape Town expressed the issue of trust in government using different terminologies. One said

You must have an environment with trust. Trust that the city is going to spend money because the business has a bigger contribution to the city income. So the government should be able to account for the money given to the city (R1CT - Government).

Trust is also an issue in terms of the role government plays as a responsible stakeholder, who is entrusted with large sums of funds from business stakeholders. Because of these dynamics, trust and transparency are important in understanding which public or private entity can be held accountable if something should go wrong, and how citizens' rights as impacted stakeholders are enforced or protected.

The challenge with most public projects is the connection of either the project or the project leadership to a political agenda (Fakir, 2009). Respondents in Cape Town associate the successful adoption and implementation of some initiatives to the level of trust, credibility and confidence residents and other multi-stakeholder groups have placed in city officials. Respondents expressed their views on trust in this way:

I think some of our other colleagues in other metros in the country, there's not necessarily a trust because if I can't get your utilities and your water bill right, how can I even trust you with anything. I think we've managed to display a sense of responsibility. The conversation and the platform is there to dialogue, to engage in dialogue. If we are a little untrusting we'd have no relationship with the community. I think we got a good relationship with the community because our political leadership has delivered on their promise (R4CT - Government).

The implication is that business stakeholders, such as investors (local and international) and private businesses, are open to support government-led initiatives financially. Although trust earned by the city from businesses and local communities seems to have strengthened ties with local government, some government employees feel vulnerable in their role. One respondent said 'it is always tricky as a

government to do those one-on-one engagements because it opens you up to a lot of criticism' (R7CT- Government). The vulnerability is attributed to the risks associated with the consequence of consulting on a one-to-one basis with stakeholders. The City of Cape Town has widened channels towards inclusiveness. Some of these channels may promote transparency and encourage public participation.

In Nairobi, the topic was not explicitly raised but, some of the comments suggested the need for trust in government and public related projects. One of the respondents said

I would have taken much greater risks, but it's not easy to take risks in a developing country without being confused with corruption and other things (R14N - Government).

In context, the comment implied the difficulty of leading government projects especially in Africa where cases of corruption, mismanagement of funds and embezzlement in government are rife. I suggest trust is important because it fosters an environment for inclusiveness, transparency, accountability and is able to support the long-term success of partnerships or relationships. It is also a point of concern in these projects as large sums of money are involved which can easily be misdirected or mismanaged by those responsible for the agendas.

6.3.3.5 *Engagement Tools*

The requirements for continuous communication and engagement between project owners and the relevant stakeholders was strongly emphasised by respondents in Cape Town and Nairobi. These two cities noted the advantageous role that ICT or Information Systems play in such initiatives, such as their capacity to disseminate information and facilitate virtual interactions (Odendaal 2006). The era and context in which the Smart City agendas are being pursued and implemented makes it possible to reach a wider community within short spaces of time. These tools also assist in the identification and prioritisation of objectives as well as the process of mapping out key stakeholders to engage at different phases of the projects (Ielite & Olevsky, 2015).

As such, Cape Town and Nairobi have implemented engagement tools for the purposes of communication, interaction and engagement. These are telephone hotlines, municipal websites, portals, emails, teleconferences, surveys, public meetings, focus groups, workshops, seminars, staffed expos, radio and newspaper publications as well as social media (Facebook, Twitter and YouTube). For example, a respondent in Nairobi recalls a seminar conducted with local stakeholders in which media was involved as well as to cover the purpose of the seminar for publication. He said 'most of our seminars or conferences are well covered by media i.e. when we had a meeting with KEPSA (Kenya Private Sector Alliance), we also had an engagement with Kenya Property Development Association, we also had that well covered by media, we indicated the progress so far and the information is available on our website' (R23N - Government).

However, it appears that the influence and priority given to specific stakeholders sometimes dictates the kind of tool used to engage the stakeholders. A respondent gave an example of the form of engagement tools and channels used for a different set of stakeholders like investors and locals, the respondent said "we have done several tours in India, US, China. They have attracted a number of people like investors through such tours and locally, we use expos" (R22N - University).

The use and importance of technological tools to engage stakeholders was emphasised in the two cities due to the complexity and scale of the projects. ICT is considered central to enabling communication, sharing, virtual engagement and advertising that also extend to external potential stakeholders nationally and internationally.

6.4 REPORTED CHALLENGES TO ADOPTING SMART CITY AGENDAS

Much like most city-wide development projects, the Smart City agendas for these two African cities have not progressed to the levels they are currently without challenges. Section 2 of this study provides a list of challenges identified from literature. These challenges resulted from a study carried out on 10 cases of cities pursuing Smart City initiatives around the world. The report noted challenges with, obtaining buy-in from stakeholders; sustaining stakeholder interest and participation; inclusion of poorer areas in the programme; resourcing and funding the programme; policy hurdles; and obtaining residents' participation (Black & Veatch, 2016; Ojo et

al., 2014). The Black and Veatch (2016) survey of Smart City initiatives around the world reports that nearly 70% of those surveyed mentioned budget constraints as an acute limitation to Smart City agendas.

The comments provided in the table following indicate how Cape Town and Nairobi respondents articulated some of the challenges and issues they experience regarding the development and implementation of the Smart City agendas. Table 10 is a compilation of comments by respondents related to specific challenges each city is facing with the development of the Smart City agenda. These are pieces of text taken directly from interview transcripts to show how the respondents described challenges in their own words.

A closer analysis of these comments reveals that they are consistent with challenges identified from literature. Challenges such as: budget constraints, funding, lack of resources, shortage of digital skills and expertise, policy hurdles, ownership in some instances by stakeholders, gaining stakeholder support and dynamics of trust and transparency were identified. Although these are present across the two cities, challenges such as defining the concept and planning around it to accommodate local contexts is more evident in Nairobi. The city emphasised that conceptualisation and definitions of the Smart City agenda has been more of a challenge. A respondent said 'conceptualisation of such an idea and planning takes time' (R23N - Government), while another respondent also made the same point by saying 'conceptualisation of the Smart City phenomenon to fit local needs and implementation' (R14N - Government). Cape Town articulated a similar challenge but not for definitions. The city's challenge is more around getting leadership to align with the vision of a Smart City. A respondent mentioned an issue with 'understanding and communicating the vision of the Smart City concept to leadership' (R4CT - Government).

Funding was emphasised in both cities. Respondents said 'lack of funding to deploy digital applications' (R11CT - Government). In Nairobi, the issue of funding is affecting the speed at which the agenda is developed and implemented. This is partly because a major portion of the funds are from investors, who are needing certain infrastructural and policy models to be in place beforehand and this has slowed down the process. A respondent said "the funding takes long to be approved"

(R13N - University), another also said 'implementing a project of this magnitude with many competing financial needs has been a challenge' (R23N – Government). These were noted as issues impeding the speed at which the Smart City initiatives are being rolled out. In addition, Nairobi's agenda was also developed during change-over of political leadership and this affected the speed including the agenda items to prioritise.

Other challenges such as managing stakeholder power dynamics were also noted in Cape Town and Nairobi. A respondent said 'how to balance the needs of all stakeholders, especially those without the direct say in the process' (R7CT- Government). In Nairobi, a respondent said 'Self-interest, usually it's from very powerful people' (R13N).

However, although there is commonality, a challenge that seems unique to Nairobi is terrorism and the concerns of its effects on the country, particularly since Nairobi is the capital city. The intention of the table is to show commonalities across the two cities, to show how the points relate and what was emphasised more.

Table 10 : Reported challenges to adopting Smart City agendas: Cape Town and Nairobi

Reported challenges to the development of the Smart City agendas		
Challenges	Cape Town	Nairobi
Attracting investors	“the external funding that we get is principally from national government, that’s grants and then in very small areas that investors would come in and make donations. As I recall, I mean it's less than five percent of our total income stream, so it is self-funded” R11CT – Government.	“overcoming global financial challenges of attracting and sustaining investors” R23N – Government.
Change of government	“it wasn't part of our mandate, the new mayor is very socially conscious and she's driven by that agenda. It's a new area of the business and therefore the systems follow it and it is starting its investment” R6CT - Government.	“change of government in 2010 new laws and constitution people don't understand the dynamics, we just had a new constitution” R23N – Government.
Terrorism	N/A	“terrorism is a burden to our progress and development” R13N – University.
Digital illiteracy and skills	“this concerns both cities for lack of resources, knowledge and technical skills’ “digital city applications not considered part of infrastructure investment” R1CT – Government.	“whether government can in the future attract the kind of workforce required to implement and sustain a smart city” R14N – Government.
Trust	“i think that once you build transparency in government, if you are then seeking opportunities for grant funds or sole funds or foreign direct investment, potential investors feel at ease because they begin to see how money is appropriated in the organization” R2CT – Government.	“they want to cut corners and do whatever’ ‘I would have taken much greater risks, but it’s not easy to take risks in a developing country without being confused with corruption and other things” R13N – University.
Readiness/prioritisation	“which of the many smart city initiatives to prioritise” R6CT – Government.	“for Konza techno city project the issue has been readiness rather than investor interest. Investor interest has been there, they found us not ready with infrastructure” R23N – Government.
Participation	“missing standards and difficulty in engaging stakeholders especially private sector”	N/A

6.5 CHAPTER CONCLUSIONS

There are two predominant approaches to Smart City development identified in literature, these are top-down and bottom-up. Findings of this study indicate that the city of Cape Town's predominant approach to development of the agenda is bottom-up. The processes employed in the development and implementation of the agenda reflect its nature, its objectives and priorities, namely that it is propelled by a strong service and utilities focus. Nairobi has adopted a combination of top-down and bottom-up approaches, with more of the latter in the development of the agenda and the former reflected in its implementation. The extent of Nairobi's agenda is larger in size and scale as it includes significant physical infrastructure projects such as roads, universities, waste management systems, energy as well as technology infrastructure such as the broadband network roll-out. The models adopted by these cities also prioritise inclusive processes involving the beneficiaries of these Smart Cities such as citizens, businesses, government and others.

Cape Town and Nairobi's stakeholder structures are similar. These are from public, private and other sectors. According to stakeholder theory, government's role is the responsible stakeholder, while citizens are impacted stakeholders and businesses are both interested and impacted stakeholders. Research institutions and NGOs have more of an interest in the agendas. The partnerships formed are predominantly government-led and private-sector supported in both cases because Smart City agendas in these both cities are government initiatives driven by local municipalities.

Cape Town and Nairobi have designed processes and mechanisms to engage stakeholders for social and relational engagement. The evident ones include open innovation, open data and educational programmes like skills development. Others include seminars, workshops, social media platforms, emails and one-on-one consultation. While these processes and mechanisms promote transparency and encourage participation, findings indicate that trust is a major component for the long-term success of these partnerships.

It emerged that the greatest challenge to Smart City development is cost and funding for the two cities. Nairobi's unique challenges include terrorism, change of government and conceptualisation of the Smart City concept fit for an African city.

CHAPTER SEVEN: DISCUSSION AND STUDY CONCLUSIONS

The aim of this chapter is to provide a summary of the key findings of the study, to reflect on what the results mean and on how the study was conducted. The study set out to explore why and how African cities are adopting Smart City agendas, with the aim of determining the objectives (i.e. priorities, anticipated benefits and targeted beneficiaries) for adopting Smart City agendas, and to understand which models or approaches are used in their adoption.

7.1 REFLECTING ON THE FINDINGS

7.1.1 Smart City Definitions

There are many different ways of defining and understanding the idea of a Smart City according to the definitions identified from the literature and provided in section 2.1.1 (Table 1). Efforts to locally define the concept in the cases of Cape Town and Nairobi are reflected in the current Smart City agendas.

This study found that the cities of Cape Town and Nairobi do not provide prescriptive definitions of a Smart City. The actual meaning of a Smart City and how it is understood for each city is still being conceptualised as more exposure and experience is attained. What is common between the definitions of the two cities is the need to be recognised as ‘world-class’ cities or, in the case of Nairobi, the ‘Silicon savannah’ of Africa. Just as the actual definition of a Smart City remains debatable and vague in academic literature and practice, there appears to be unclarified elements of what a Smart City ought to be in practice. However, what emerged is the idea that ICT infrastructure (hard and soft) is central to the definition and development of a Smart City, and is required to facilitate digitally-connected living. The ways in which the world-class image is being pursued by Cape Town and Nairobi is where the differences are evident. The question both cities grapple with in this process is how an African city is to attain this world-class status, while maintaining its ‘African-ness’ in the most relevant and practical manner.

Cape Town understands a world-class African city as one that excels in administration and service provision, and is connected and interactive. In the context of South Africa’s history and the city’s local needs, the theme for Cape Town’s Smart

City agenda is strongly linked to the availability and use of information systems to facilitate service provision in the areas of utilities, transactions and mobility. The City of Cape Town's vision is to broaden access to high-quality public services for residents and other city stakeholders using ICT to promote connectedness, sustainability and improve transactional processes.

The city's vision of broadening access to high-quality public services for its citizens aligns with the implementation of ICT infrastructure required to facilitate digitally connected living. The agenda has been set and uses processes and mechanisms for social and economic inclusion such as open innovation, open-data platforms and digital skills development. The aim is to provide an environment that empowers stakeholders in continuous business development and innovation for the city. These mechanisms also promote interactions and participation in matters of the city affecting residents. The ultimate goal of all these pursuits is to improve the quality of life of city stakeholders.

Cape Town's Smart City resonates with Caragliu et al. (2011, p. 16) who states that

A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.

Elements of this definition are reflected in the city's Integrated Development Plan which focuses on five key pillars (the opportunity city, the safe city, the caring city, the inclusive city and the well-run city), representing a city's economic, social, political and environmental advancement for developmental purposes. However, the extent to which the definition of a Smart City for Cape Town is reflective of the stakeholders' (residents, businesses, public institutions and government) desires and visions is not clear. This can be attributed to the fact that the city is still in the process of defining dimensions of a Smart City for Cape Town.

In Nairobi, this study found that the definition of a Smart City has links to an academic definition and the version marketed by leading IT corporations, such as

IBM, Cisco and Microsoft. Nairobi's definition strongly focuses on the pursuit of global competitiveness. The city's agenda is rooted in the Kenya Vision 2030 whose aim is to transform Kenya into a globally competitive middle-income country by 2030. The agenda is concerned with positioning, marketing and promoting Kenya and Nairobi as an innovation destination through the establishment of new cities such as Konza Techno City from green fields.

The image and elements being pursued in Nairobi resonate with the definition of Chourabi et al. (2012, p. 2290) that a Smart City is

a city combining ICT and web 2.0 technology with other organisational design and planning efforts to de-materialize and speed up bureaucratic processes and help identify new, innovative solutions to city management complexity, in order to improve sustainability and liveability.

However, it is perhaps premature to pinpoint the exact definition the city has adopted, given that Nairobi is still in the process of formulating concepts and defining elements of a Smart City.

The Smart City agenda of Nairobi is closely linked to images of modern infrastructure, connectedness, digitization and centralization of services, systems and sustainability. Key themes of this image are manifest in the large-scale infrastructure projects in areas of ICT, transportation, service, education, health, finance and safety and security while promoting an economically inclusive city.

How these cities define what a Smart City is relates to the reasons why they adopted the Smart City agendas. These reasons are drivers that are pushing cities but also pulling them in a particular direction.

7.1.2 Why African cities are adopting Smart City agendas

There are many reasons why African cities are adopting Smart City agendas. These reasons fall into the categories of social, economic, environmental and infrastructure development. Each category consists of issues and opportunities being addressed. Literature reports that the dynamics of population growth, urbanisation and increases in disposable income are fuelling the demand for energy, water, transportation,

telecommunication, waste management, utilities and other infrastructure development (Dykes & Jones, 2016).

This study found that there are six main reasons why Cape Town and Nairobi are pursuing Smart City agendas. These reasons include (i) rapid urbanisation; (ii) safety and security; (iii) the digital divide and the need for social inclusion (iv) competitive global economic and financial environments; (v) diminishing natural resource bases and natural disasters; and (vi) infrastructure development. These drivers are pushing the city governments to change the traditional ways of managing city services and resources, by capitalising on scientific methods powered by technological advancement in ICT. Both Cape Town and Nairobi are responding to pressures of rapid urbanisation, but there are differences in the ways each city is responding.

For historical reasons, Cape Town, like most South African cities, was structurally divided and had segregated communities. Integral to transformation, the agenda aims to move residents closer to the city as part of its spatial planning restructuring process to socially re-integrate previously divided communities. Whereas Cape Town is bringing its populations closer, Nairobi is pushing its populations out of the overcrowded central city to the outskirts of the Nairobi County region (the location of new towns) to decongest the legacy city.

In terms of safety and security, drug-related crimes and violence are prevalent in both cities and the programs implemented reflect the legitimacy and urgency of the issue affecting many stakeholders, particularly residents in poorer communities, but also tourists and visitors. In addition, Nairobi's unique challenge is terrorism, an issue not present in Cape Town. The agenda for Nairobi prioritises safety and security as part of protecting the city from terrorism concerns. This concern is reflected in the heavy presence of police and surveillance cameras in public places around the city as well as in community-led initiatives such as Nyumba Kumi (see section 4.3.3). In Cape Town, there are concerns about crime and the city has implemented a centralised internal project, EPIC, that deals specifically with policing, disaster management and crime prevention.

There are similarities in the ways in which the cities of Cape Town and Nairobi are pursuing the image of a globally competitive city. Both cities aim to compete for

financial and economic sustainability on a global scale. Cape Town plans to position itself as a competitive city by running the city's administration and services efficiently using technology and digital processes to boost economic activity. These platforms are targeted at residents and businesses to connect them to economic opportunities locally and internationally. To achieve this, the city has invested in technological assets that support administration, service delivery and communication such as the SAP/ERP of 2002 and the Broadband fibre network of 2009. The agenda for Nairobi aims to achieve competitiveness by marketing, positioning and promoting Nairobi as an innovation hub locally and internationally. The investments in infrastructure both physical (such as new cities) and technological (broadband fibre networks) are part of the plan to strategically position the cities to compete on global markets and promote a financially fluid environment. The competition for economic and financial environments requires these cities to ensure that resources and infrastructure are available and in conditions conducive to competition.

This study found that Cape Town and Nairobi are facing increasing challenges around accessing, managing and distributing natural resources. The two cases revealed that the rate at which resources such as water, power, land and food are being consumed is creating supply challenges due to increasing populations. These demands are also placing pressure on infrastructure so both cities are responding to issues of deteriorating natural resources and infrastructure. In terms of resources, Cape Town and Nairobi have adopted technology to help with managing supply and demand using ICT. An example is the adoption of automated service processes like utilities. In terms of infrastructure, this study found that Nairobi's Smart City agenda includes large infrastructure projects, both physical and technological, as well as urban renewal and new city buildings. Cape Town's Smart City agenda makes infrastructure investments that focus on services, administration and transportation networks.

Therefore, we see that local contextual conditions such as history, culture, socio-economic and environmental factors play a role in the reasons for adopting Smart City agendas. The two cities' approaches to dealing with challenges of population increase, safety and security, competitiveness and deteriorating natural resources base and infrastructure are determined by the local conditions of the city as well as

the opportunities in each city. In turn, these reasons and responses are influencing the core objectives and priorities of the Smart City agendas.

7.1.3 Objectives of the Smart City agendas

There are a number of consistent themes related to the objectives, priorities, anticipated benefits and the targeted beneficiaries of the Smart City agendas of Cape Town and Nairobi. These objectives reflect the broader development vision and mission of the two governments towards the future of these cities.

Cape Town's Smart City agenda has three main objectives. These objectives are drawn from the city's five strategic pillars. The first is internally focused, that is, to change and improve systems, data, resources and processes within the organisation. The goal of this objective is directed towards the pursuit of a well-run city. The second objective has an external focus to promote inclusion of citizens in the city's activities by empowering them to access and use technology to interact and communicate with the city for services, economic opportunities and to participate in city matters. The third objective focuses on the adoption of ICT specifically to boost economic growth for investment, job creation and to promote a culture of entrepreneurship and innovation.

Nairobi's Smart City agenda has four main objectives. These are: to develop and promote an ecosystem for technological innovation; to create and market Kenya as an investment hub for multinationals and foreign investors; to improve the quality of life of its residents through digitally connected living; and to integrate and centralise all government agencies and city services. The Smart City agenda is designed to help achieve all four objectives in a concerted way using technology solutions.

What is common and central to these objectives in both the two cities is the belief that ICT is pertinent to achieve success. The agendas place strong emphasis on the digitisation and centralisation of city services, processes, data and systems. As a result, the two cities have invested heavily in ICT infrastructure that supports connectivity. One example common to both is the city wide roll-out of broadband fibre currently underway in Cape Town and Nairobi. The objective is to facilitate digitally connected living for residents businesses and organisations in pursuit of a world-class and globally connected city.

Many of the cities initiating Smart City agendas have questions about the value a Smart City adds and who benefits. Lee & Lee (2014), state that the ultimate goal of a Smart City should be to create sustainable value for citizens, businesses, shareholders and other stakeholders. The findings of this study revealed four themes which have led to the prioritisation of a number of key projects in these cities to achieve the following aims.

- i. **Institutional optimisation:** Relates to the use of ICT in governance, service delivery and interaction; stakeholders who benefit from this objective are government agencies and other stakeholders who have an interest in institutional optimisation such as private sector and civil society.
- ii. **Growing the digital economy:** Focused on attracting entrepreneurs, investors, expatriates and growing entrepreneurial businesses to stimulate economic growth and create jobs; this objective has a wider and broader focus in terms of the stakeholders, they include government, businesses and investors both local and foreign.
- iii. **Harnessing technology:** Using infrastructure (especially ICT) to improve and transform life and work within and outside the city; stakeholders for this objective are citizens, businesses, visitors and government employees.
- iv. **Unleashing the potential of citizens:** Considers the role of people, education, learning and knowledge as key drivers of a Smart City. The objective targets citizens as knowledge workers and provides platforms that promote digital inclusiveness. The kinds of stakeholders affected are businesses, residents and citizens.

Although the Smart City agendas of Cape Town and Nairobi are similar in many ways, these cities are not becoming smart in the same way, to the same extent, or at the same speed. This reflects in part the differences in priorities: administration, transportation, resources management and crime prevention for Cape Town and infrastructure; disaster management, safety and security and transportation for Nairobi. The objectives and priorities for Cape Town's agenda are driven by South Africa's history of inequality and focus on improving city management and promoting citizen access to economic opportunities through digital connectedness. Nairobi's objectives relate to the Kenya Vision 2030, driven by the goal of greater international

presence. Perhaps the most significant difference is that Cape Town looks less explicitly to the international community than Nairobi does. This is probably because the Smart City agenda of Nairobi is closely tied to the national goals for Kenya.

7.1.4 Approaches adopted to setting the Smart City agendas

The Smart City agendas of Cape Town and Nairobi are similar in terms of the objectives and what is being prioritised, however, the ways in which they are developing and implementing these agendas is where the differences are evident.

The two predominant approaches to Smart City development are top-down and bottom-up models. The top-down model requires that Smart Cities are planned, designed and developed based on specific blueprints. The bottom-up model requires improving existing cities with smart features and usually includes the upgrade of an existing city in a phased manner or improvements driven by citizens by ownership. Bottom-up models can use process-oriented or ownership approaches (Datta, 2015).

This study found that Cape Town's Smart City agenda has been developed predominantly using a bottom-up process-oriented approach, although there are elements of a bottom-up ownership approach in various initiatives.

In Nairobi, the researcher observed all three approaches. This is due to the scale and size of the agenda. The government adopted a top-down approach specifically for the implementation of Konza City because of the nature of the project as a greenfield development project. However, development of the overall agenda was established through consultations with various stakeholders. These stakeholders own some of the initiatives, especially those pertaining to safety and security. These initiatives are being implemented using a bottom-up ownership approach. Upgrades and improvements being made to the legacy city are through a bottom-up process approach with evidence of consultations with various stakeholders in the city.

Further, the study found that the management of the agenda for Cape Town was done through local municipal government. Nairobi, on the other hand, has established a formal body under the Ministry of Information and Communication of the government of Kenya, called KODTA. The sole mandate of this body is to project manage the Konza City project and oversee all phases of the project from conception to implementation.

7.1.5 Stakeholder theory

Stakeholder theory was chosen as a lens through which to conduct this research for its principles and frameworks, which are related to this research. This study set out to achieve two objectives: to understand why African cities are adopting Smart City agendas and how they are going about developing the Smart City agendas. Stakeholder theory was useful for the study because it helped to identify the identity of stakeholders; the category to which they belong; the roles and responsibilities they have; and who the intended beneficiaries of the Smart City agendas are. The study found that the three main role-players in this classification are government, citizens and businesses. However, other stakeholders are IT corporates, international companies, civil society and development agencies.

The theory proved useful in answering the question of how cities are going about developing their agendas. The models and approaches employed in the development of the agenda clearly showed different roles for different stakeholders. However, although stakeholder theory was useful in identifying and classifying stakeholders, the theory was not useful in examining the roles of other stakeholders such as social clubs, legal entities and non-investors. In addition the classification of stakeholders was at times not fine-grained enough. I discuss below the need to distinguish different categories of residents and businesses.

This theory was also useful in clarifying the processes and mechanisms employed in engaging these stakeholders. The stakeholder classification model by Mitchell et al. (1997) and its associated attributes of power, legitimacy and urgency was particularly helpful in understanding how agendas are developed and prioritised. The study used this classification to identify which stakeholders would be key to informing the Smart City agendas. The identification and categorisation was useful in understanding relational dynamics in terms of who has power and influence over the agendas, and what needs are treated as urgent and legitimate. In so doing, the theory identifies who has input in the decision-making process as well as who benefits from the outcomes of such decisions. Identification of the stakeholders and understanding the priority given to them helped to distinguish between plans driven by external infrastructure developers such as ICT companies and property

developers and those developed and driven by city governments to address specific local conditions.

Programs contained within the Smart City agendas of Cape Town and Nairobi reflect the city governments' roles and responsibilities towards institutional efficiency. Issues of rapid urbanisation, safety and security, social inclusion, disaster management and deteriorating infrastructure are overwhelming city governments and they are on the look-out for solutions using ICT.

In the cases of Cape Town and Nairobi, the findings indicate that the main role of government is that of a responsible stakeholder. This is based on the responsibility it has to manage the city. City governments also exercise power and authority demonstrated in the ways in which some programs are given priority and the urgency with which government addresses each issue. For example, Cape Town's focus on social inclusion programs are justified by the legitimate claim of government to deal with residents' segregated communities. As such, the city exercises power and responsibility as a stakeholder to ensure these issues are redressed.

The citizens' role in these initiatives is that of an impacted stakeholder because of the impact the agendas have on their quality of life. This study did have to distinguish between residents who are wealthier, better educated and consequently more influential and those who are poorer, less educated and generally less influential because the former may benefit more than the latter from Smart City initiatives. The needs and demands of wealthier residents, such as the expectation for modern facilities and services are likely to be more forcefully expressed and hence addressed with urgency, while less empowered residents whose needs and expectations are more to do with improved living conditions, jobs, and housing may be less well placed to articulate their demands. All residents remain impacted regardless of the approach chosen in the development of the agenda, or whether the agenda is reflective of their interests.

The role of businesses is also complex. Businesses may be impacted, responsible or interested stakeholders. This is because the private sector may play multiple roles. Local businesses are likely to be impacted while international businesses are

interested. Where companies are involved in providing Smart City solutions, they become responsible stakeholders.

This study also found that although these agendas are predominantly government-led and private-sector supported, in Nairobi, a significant percentage of the funding is from the private sector including local and international businesses, investors and traders.

Other stakeholders include developers, IT companies, architects, engineers, legal entities, NGOs, schools, research institutions, think-tanks, aid organisations, clubs, media, environmentalists and many others. There are overlaps in roles and responsibilities depending on the assigned role towards the agenda. For example, research institutions' role is often to conduct research and provide input for knowledge and expert advice into the agendas and based on their knowledge in a particular field and out of their own interest.

The anticipated benefits of these Smart City agendas are classified into the categories of economic, technological, social, and environmental and these were common to both cities with little difference in terms of what and how they expect to benefit from the agendas. The overarching expectation of the benefits is that the quality of life of citizens and residents will be improved. In summary, these include job and employment opportunities, access to better services, improved administrative processes and inclusion using digital technologies. Each city also expects to gain social and economic benefits from greater investment in ICT infrastructure.

It emerged from the Cape Town and Nairobi cases that the direct beneficiaries of these agendas are citizens, businesses and government with other indirect beneficiaries being tourists, visitors and, particularly in Nairobi, expatriates due to their larger presence. This study found that the intended benefits are not exclusionary; they are inclusive of all stakeholders. The cities of Cape Town and Nairobi indicated that it is government's ethical obligation to ensure that the interests of all stakeholders, especially poorer residents, are recognised, supported and given priority. This study found that the city governments are aware of the relational dynamics between stakeholders and what influence they have on the agendas.

This study found that in order for these cities to effectively manage and coordinate the wide array of stakeholders, the use of technological platforms was necessary. The two cities adopted the use of ICT tools in order to create a more participatory and engaging environment (Paskaleva et al., 2015, in Bolivar, 2015). There are numerous engagement methods available for public interaction and many of these options are technologically enabled, specifically for the Smart City agendas. Those used in Cape Town and Nairobi are open innovation, open data and educational programmes for training and digital skills development.

Open innovation and open data are made available for citizens and businesses for information sharing and collaborative development. The stakeholders who interact frequently on these platforms to create innovative solutions are businesses and the increasingly technology-savvy residents. However, training and digital skills development target residents. In formal organisations, these include employees and staff. Skills development programmes are facilitated through partnerships with private-sector stakeholders and universities. These platforms are part of the intention to develop and promote an integrated approach to an inclusive society through digital means that can improve the lives of citizens in these cities.

This study found that to communicate with stakeholders, the following were used; seminars, workshops, meetings, expos, newspapers, traditional media (TV and radio), social media (Twitter, Facebook and YouTube), one-on-one consultations, emails, letters, project websites, municipal websites and project reports and other available media forums. While most of the media are formalised and controlled, social media platforms are open to all citizens and are often used to establish concerns or the interests that the impacted stakeholders may have.

7.1.6 Challenges to adopting Smart City agendas

This study found that Cape Town and Nairobi are experiencing challenges with the current Smart City agendas. These are funding, costs, constrained budgets, skills gaps, stakeholder interest, participation, inclusion of poor areas and other socio-cultural issues such as trust, are impeding the speed at which the Smart City agendas are being rolled out. Moreover, a unique challenge to Nairobi is terrorism and its effects on the country's social security, particularly in Nairobi as the capital city of Kenya.

7.2 HOW THE STUDY WAS CONDUCTED

The researcher undertook a comparative case study of two African cities (Cape Town and Nairobi). The study made use of primary and secondary data sources. Primary data was collected through interviews with various city stakeholders. An interview schedule was used to conduct semi-structured, face-to-face interviews with those identified as stakeholders on the Smart City initiatives. A total of 23 interviews were conducted between the two cities (12 in Cape Town and 11 in Nairobi). The duration of the interviews ranged between forty - five minutes to an hour in length.

The first data collection trip was conducted in Cape Town in February 2016 over a period of five days. The trip was short and structured; this was partly because before leaving for Cape Town, eight interviews had been diarised. At least three interviews were conducted per day with the various stakeholders involved in the Smart City initiatives of the city of Cape Town. Data collection in Nairobi was conducted in April 2016 over a period of 14 days. The collection process was more unstructured compared to Cape Town because it was difficult to pre-schedule interviews.

Secondary data was collected from documents covering Smart City agendas such as policies, plans, city-wide strategy plans, project websites, academic papers, and media reports. Data collected was analysed using thematic analysis to identify which themes occur, how often, in which context, and the relationships between the themes as they reflect on the research questions.

7.3 LIMITATIONS

This study focused only on two African cities out of the 50 largest cities in Africa. These findings cannot be generalised to other cities elsewhere even among countries within a similar socio-economic context. Due to the fact that Smart City agendas are relatively new in Africa, only a few cities on the continent are reported to have adopted Smart City agendas. However, of these, most are either at planning or strategy formulation stage.

The engagement timeframe with the stakeholders during the study was relatively short. As a result, not all stakeholders identified as key to the study were accessed during data collection. Therefore the findings may be lacking perspectives from some key stakeholders. The use of stakeholder theory to understand the different

stakeholders involved in Smart City agendas helped to identify the range of stakeholders and their different roles in the study. However, the study was not able to draw conclusions that pointed to significant differences in the intended benefits for different stakeholders.

Contrary to concerns raised in the literature that Smart City agendas benefit some at the expense of others (Watson, 2014), this study found that Smart City agendas, at least in their formulation, are intended to benefit a wide range of stakeholders. Further research would be needed to assess what benefits are actually realised, and for which stakeholders.

7.4 FURTHER RESEARCH

The Smart Cities concept is fairly new and it is newer in some cities than in others. Hence little research has been conducted in this area, specifically in Africa. As a result, it is difficult to tell at this stage whether the Smart City projects undertaken in Cape Town and Nairobi are successful. However, although generalisations cannot be made, this study has provided insight into the reasons why African cities are adopting Smart City agendas and how these cities are going about developing these agendas. Based on the insight gained, further research is still required to examine the following:

- i. Who the stakeholders are in other cities in Africa and which of them are being prioritised in Smart City agendas;
- ii. Research into assessing what benefits are realised from the Smart City agendas and for which stakeholders; and
- iii. Research into evaluating project success, especially in those African cities further along in implementing Smart City initiatives.

7.5 CONCLUSION OF STUDY

This study set out to understand why and how African cities are adopting Smart City agendas. It explored why Cape Town and Nairobi are adopting such agendas, including how they are going about setting the objectives, including what the priorities and anticipated benefits are and the targeted beneficiaries. The research further explored the models and approaches used in setting the Smart City agendas.

The findings of the study indicate that there are numerous reasons for African cities to adopt Smart City agendas. Specifically, for Cape Town and Nairobi, four drivers emerged. These include: rapid urbanisation, safety and security, competitive global economic and financial environments, and deteriorating natural resources and infrastructure. To address these reasons, agendas have been developed with specific objectives. These are prioritizing certain aspects of the city such as administration, inclusiveness and economic growth for Cape Town, and technological innovation, attracting investment, improving the quality of life and integrated services for Nairobi. Ultimately, these objectives are set to realise institutional optimization, encourage economic growth, harness technology, and unleash the potential of citizens in the cities of Cape Town and Nairobi.

While there are similarities in the reasons why Cape Town and Nairobi have adopted Smart City agendas, there are differences reflected in what has been prioritised and the approaches used in setting the agendas. Comparison of the two cities has shown that the local context within which Smart City agendas are pursued, such as culture, history, socio-economic factors and political and environmental conditions influence the objectives, priorities, anticipated benefits, targeted beneficiaries and the approaches adopted.

Findings indicate that the City of Cape Town's predominant approach to the development of a Smart City agenda is bottom-up, while Nairobi has adopted a combination of top-down and bottom-up approaches, with more of the latter in the development of the agenda and the former reflected in implementation approaches.

This study found that although there are many factors that contribute to the advancement of the Smart City agendas, stakeholder partnerships and funding models are critical to this advancement. Cape Town and Nairobi's agendas are funded by a mix of stakeholders. The nature of the partnerships formed for the agendas are predominantly government-led and private sector-supported partnerships.

Cape Town and Nairobi have designed processes and mechanisms to engage stakeholders. The prevailing ones include open innovation, open data and educational programmes for training and skills development. Others include

seminars, workshops, expos, social media platforms, emails and one-on-one consultation. While these platforms promote transparency and encourage participation, findings indicate other social behavioural characteristics, such as trust, are critical for the long-term success of the agendas.

It is important to note that the Smart City agendas are not an isolated list of ideas the cities are pursuing. Much of the items on the agendas are derived from the government's broader vision for the country, the nature of each city's contextual conditions and their unique challenges and opportunities. Common themes between these two cities such as increased economic sustainability and resilience, the use of ICT and improved quality of life emerged as core elements that form part of a Smart City. In all these pursuits, ICT is perceived as an enabler for its ability to enhance and propel development ideas, given its capacity to broaden access and disseminate information. This is the key for a 21st century city that aims to improve the quality of life of its residents, become globally competitive and attain sustainability.

Irrespective of their differences, these agendas reflect the willingness of African cities to take ownership and direct their future towards realising Africa's potential.

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1. APPENDICES

2. APPENDIX A - RESEARCH INSTRUMENTS

City Residents

1) What is your understanding of the term “Smart City”?

(probe: as a resident, what is your understanding of the term “Smart City”?)

2) Do you know about the city’s plans to transform into a Smart City?

3) As a resident are you aware of the objectives (priorities, benefits, anticipated benefits) of the Smart City agenda?

(Probe: Are you aware of the services that will be offered by the Smart City?)

What areas of the city do you think should be of priority in terms of the Smart City agenda?

(Probe: which areas that are key to the city do you think should be prioritised: transportation, energy, water, housing, public safety etc.). How does this impact your life?

4) Did you participate in any form of stakeholder workshop or forum into the setting of the Smart City agenda?

- How did you get involved? (i.e. social media, workshops, discussion forums, newspaper)
- How often do the stakeholders meet?
- Who represents you to the city government?

(Probe: Is it a church group, elected representatives, NGO, rate-payers association. Do you know if they were part of a stakeholder meeting?)

City Businesses

- 1) What is your understanding of the term “Smart City”?
- 2) Are you aware of the city’s plans to adopt a Smart City agenda?
- 3) As a business are you aware of the objectives (priorities, benefits, anticipated benefits) of the Smart City agenda? (Probe: Are you aware of the services that will be offered by the Smart City? How does it affect or impact the way you run your business?)
- 4) What is your relationship with the city?
(Probe: Do you form part of the stakeholder group of the Smart City initiative? What partnerships have you formed with the city/drivers of the Smart City initiative? How are you involved in the Smart City agendas as a stakeholder? (i.e. funder, research, investor, etc.) Are there meetings held with other stakeholders and what methods of engagement are involved?)
- 5) What are your anticipated returns on investment (benefits) of the Smart City agenda towards your business? (Probe: What are the priorities for your business?)

City Officials

Why are African Cities Adopting Smart City agendas?	How do cities arrive at the objectives (e.g. priorities, anticipated benefits and beneficiaries) of their Smart City agendas?	How are cities going about setting up their Smart City agendas (what models or approaches are used in setting up Smart City agendas)?
<p>1) How does the city define a Smart City?</p> <p>2) Do you have any Smart City initiatives in place? (probe: how did the initiative start?)</p> <p>3) What challenges or opportunities have led to the adoption of the SC agendas?</p> <ul style="list-style-type: none"> • (i.e. migration, population increase, economic growth, diminishing resources base, environmental challenges? • How has the government and stakeholders managed the city before the resolution to transform the city into a Smart City? <p>4) Smart Cities have been presented as good initiatives as solutions to the challenges that cities are face; however, there are some critics. Has there been opposition to the Smart City agendas?</p> <p>(Probe: Tell me more about it? e.g. money misspent, under resourced, residents not involved etc.)</p>	<p>1) What are the main objectives of the Smart City agenda? (probe:</p> <ul style="list-style-type: none"> • What role do Information Systems/ICT play into the Smart City implementation process? • Which technologies are being considered for the implementations? • What are the priorities of the Smart City agenda?) <p>2) What is the alignment of the anticipated benefits to the broader city development objectives? (i.e. transportation, energy provision, infrastructure, healthcare services, digitally connected living, general (QOL)</p> <p>3) What is the current status of funding, participation and capacity to meeting the set objectives?</p> <p>4) How does the initiative affect the residents and communities of the city? (i.e. low income groups, under privileged, unemployed, disabled) (Probe: Who are the targeted beneficiaries for the Smart City initiative? Do you expect property rates to increase? How will people afford that?)</p>	<p>1) Who are you partnering with, What approach are you using in identifying/ setting the Smart City agendas?</p> <p>Do you engage communities or local residents and/ or do you involve external experts' e.g. IBM, Cisco, construction corporations?</p> <p>2) Who are the stakeholders of the initiatives, and what role do they play? (i.e. local residents, civil society movements, businesses, funders, investors etc.)</p> <p>Who are the primary drivers behind the Smart City initiatives (i.e. residents, businesses, foreign investors, government)?</p> <p>What is the current status of funding, and capacity to meeting the set objectives?</p> <p>At what stages are these stakeholders involved (from initial stages to completion)?</p> <p>3) What processes are undertaken in planning and implementing the Smart City agendas? (Probe: How is the initiative organised and managed?)</p> <ul style="list-style-type: none"> • What stakeholder engagement methods do/have you applied (i.e. newsletters, project website, hotline and community forums, social media) • In working with your stakeholders, what have been some of the challenges experienced?)

2.2 APPENDIX B – PARTICIPANT INFORMATION SHEET

Participation Information Sheet (PIS)



Good Day

My name is Nalukui Malambo and I am a Masters student in Information Systems at the University of the Witwatersrand, Johannesburg. I am conducting research about Smart Cities in Africa. The title of the study is: ***Adoption of Smart City Agendas – Exploring the case of Cape Town and Nairobi***. The purpose of my study is to explore why and how African cities are adopting smart city agendas, with the objective of understanding:

- What motivates African cities to adopt smart city agendas
- What are the objectives (priorities, anticipated benefits and beneficiaries) for developing smart city agendas?
- What approaches are used in identifying/setting smart city agendas.

As a stakeholder of Smart City initiatives, you are invited to take part in an interview. Your participation is completely voluntary and involves no risk, penalty, or loss of benefits whether or not you participate. There are no right or wrong answers and you may withdraw from the interview at any stage.

This interview is both confidential and anonymous and you do not need to provide your personal details should I quote your words in the report, I am not going to use your name.

The interview should take approximately 45 minutes to 1 hour to complete; and the interview will be audio recorded with your permission using a recording device. This study was approved by the Wits University Research Ethics Committee (Non-Medical), Protocol Number: *H15/10/18 Malambo*

Thank you for considering participating. Should you have any questions, or should you wish to obtain a copy of the results of the interview, please contact me on (+27) 843594942 or at nalukui.malambo@wits.ac.za

My contact details: nalukui.malambo@wits.ac.za – Cell number: (+27) 843594942

My supervisor's name and email are: Professor Judy Backhouse -
judy.backhouse@wits.ac.za

Telephone: (+27) 117178161

Signature.....

Kind regards

Nalukui Malambo

Masters Student

School of Economic and Business Sciences

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2.3 APPENDIX C – PRE-SET THEMES FOR CODING

Pre-set Themes Drawn from Literature				
Smart Cities	Smart City Agendas	Objectives	Stakeholders	Models /Approaches
Smart City definitions	Smart City agendas	Priorities	Stakeholders	Models
Technology	Smart City initiatives	Benefits/Outcomes	Partners	Approaches
Information Systems	Smart City projects	Beneficiaries	Partnerships	Frameworks
Interconnected City	Smart City adoption	Quality of life	Experts	Top-down
Digital City	Smart People	Investment	Categories	Bottom-up
Information City	Smart Mobility	Economy	Stakeholder attributes	Planning
Intelligent City	Smart Economy	Development	Stakeholder type	Processes
Creative City	Smart Governance	Digitally connected living	Partnership type	Planning processes
Instrumented City	Smart Transportation	Informed living	Engagement	Development processes
Eco City	City development	Impact	Engagement tools	Implementation process
Networked City	Secondary city	Contribution	Engagement methods	
Knowledge City	E-governance	Environment	Platforms	
Smart characteristics	Agendas Master plans	Social inclusion	Mechanisms	
		Digital divide	Participation	
		Green environment	Contribution	
		Urbanisation	Leadership	
		Safety	Management	
		Security	Communication	
		Infrastructure		