The University of Sheffield

School of Architecture

SUSTAINABLE URBANISATION IN DESERT CITIES: CASE STUDY RIYADH CITY

By:

Talal Alshammari

Supervisor:

Prof. Karim Hadjri

October 2019

Abstract

Sustainable urbanisation (SU) has become a major preoccupation for many cities worldwide in light of projections that the urban population will keep increasing by 2050 to 68 percent of the world's total population as per UNDESA's statistics in 2014. Riyadh has transformed into one of the largest cities in the Gulf region. The General Authority on Statistics estimates that by 2030 the city's population will increase to 10 million from the current 7 million. Its urbanisation and rapid increase in population has created new environmental, social, physical, and economic challenges for urban planners who need new tools and mechanism to ensure sustainable development and growth of the city and its region. The objective of this research is to identify the factors that inhibit or enhance sustainable urbanisation in Riyadh and propose a Sustainable Urbanisation (SU) framework that can guide future development of the city. Data was collected through in-depth interviews with Riyadh residents, urban planning and municipality officials and academics/researchers. Content analysis was conducted to investigate the inhibiting and enhancing factors of SU in Riyadh and establish the state of urbanisation in Riyadh. The issues/factors inhibiting sustainable urbanisation include poor coordination among urban planners; low public awareness; outdated urban planning policies and legislation; environmental degradation (e.g. decreased air quality and poor waste management); rapid population growth; lack of affordable housing; and social inequality. Factors that can enhance SU include international migration, political will, Information and Communication Technology (ICT) and revenues from oil exports. These findings are empirical evidence that can guide stakeholders on the strategies to overcome challenges to and opportunities for sustainable urbanisation. The study proposes reforms to the urban planning structure, participatory governance, exploitation of ICT, empowerment of SMEs, use of renewable energies, public-private partnerships (PPPs) and use of smart building technologies to harness the opportunities presented by urbanisation. A SU framework – to guide sustainable development in Riyadh and Saudi Arabia – was developed based on study findings. Key stakeholders in implementing this proposed SU framework include urban planning officials, Riyadh residents, private sector and the academia.

Acknowledgements

It has been a whirlwind journey through this research whose endgame is to improve the understanding of sustainable urbanisation and contribute to the achievement of sustainable development in Saudi Arabia as encapsulated in the National Transformation Plan 2020 (NTP 2020) and Saudi Vision 2030. The success of this project would have been a mirage had it not been for the unwavering financial, emotional, moral and spiritual support from family members, project supervisor, faculty as well as the study participants. My utmost appreciation first of all goes to the Almighty Allah to who I am indebted for his unlimited mercies in overcoming obstacle after obstacle. Special thanks go to my parents, Obaid Alshammari and Fatmah Aljarallah who have reared me to appreciate knowledge and for their constant support as I trudged on with this dissertation. Eternal gratitude to King Abdullah bin Abdulaziz Al Saud and King Salman bin Abdulaziz Al Saud for them support extended to me as an overseas student as well as Aljouf University for the financial support throughout my graduate studies. I also would like to thank my wife and my children for their enduring love that drove me on during the long periods that I spent outside our home while working on the PhD. I also extend my gratitude to my project supervisor Professor Karim Hadjri whose intellectual insight, constructive criticism, and patience provided me with a broader grasp of many relevant issues insofar as this dissertation is concerned. Equally integral to the success of this research project were various ministries and agencies in Saudi Arabia, which were more than willing to provide assistance or aid required for data collection and analysis. In this regard, I am indebted to the following agencies: Ministry for Municipal and Rural Affairs (MOMRA); Ministry for Town Planning; Arriyadh Development Authority (ADA); Riyadh Amanah; and sub-municipalities in Riyadh. Not to be forgotten are the faculty members and staff at the College of Architecture and Urban Planning, at Saudi Arabia. Your eagerness to assist in the success of this dissertation is eternally etched in my memory. May Allah bless you all.

Abbreviations

KSA - Kingdom of Saudi Arabia

ADA - Arriyadh Development Authority

GAMEP - General Authority on Meteorology and Environmental Protection

GAS - General Authority on Statistics

GCC – Gulf Cooperation Council

HOK - Hellmuth, Obata + Kassabaum Architects

ICT - Information and Communication Technology

JLL - Jones Lang Lassalle

MEDSTAR - Metropolitan Development Strategy for Arriyadh

MOMRA - Ministry of Municipal and Rural Affairs

SME - Small and Medium Enterprises

SU - Sustainable Urbanisation

UAE – United Arab Emirates

UNDP - United Nations Development Programme

UNDESA - United Nations Department on Economic and Social Affairs

UNHABITAT - United Nations Human Settlement Programme

UNICEF - United Nations Children Education Fund

WHO – World Health Organisation

WCED – World Commission on Environment and Development

WSSD – World Summit on Sustainable Development

Table of Contents

List of Tables

List of figures

CHAPTER 1: INTRODUCTION

1.1. Urbanisation in Riyadh

1.1.1. What is urbanisation?

The definition of urbanisation may vary from city to city or country to country depending on the unique contextual circumstances. However, the common denominator in the various definitions of urbanisation is that it involves the transformation of previous rural areas into urban areas. Peng et al. (2014) for instance define urbanisation as the transformation of rural areas into urban centres due to industrialisation and economic development. Likewise, Miller (2014) describes urbanisation as the structural transformation of agricultural peasant societies into manufacturing ones and eventually into service economies. Urbanisation has also been defined from a demographic aspect by various scholars who hold that it is a process that involves the shift in population from the rural to the urban areas. McGranahan and Satterthwaite (2014) point out that urbanisation within a national territory implies that the urban areas are gaining an increasingly growing share of the total population in comparison to the rural areas. It can also be described as the redistribution of rural populations to the urban settlements (Peng et al. 2014).

These descriptions of urbanisation imply that urbanisation and economic growth or industrialisation are synonymous. Indeed, Miller (2014) describes the stylised three stage growth model that begins with an agricultural peasant society before metamorphosing into a manufacturing society and finally into a service economy. Subsequently, within the context of this model, the assumption is that industrialisation will lead to urbanisation as the quality of life improves, jobs become available and rural migrants troop to the urban areas in search of employment opportunities and means to improve their livelihoods. Nonetheless, Miller (2014) adds that the urbanisation process in many developing countries, especially Africa, has rendered the stylised three stage growth model invalid insofar as urbanisation in African cities is concerned. This is owing to the fact that many cities in Africa have urbanised without industrialisation. Subsequently, McGranahan and Satterthwaite (2014) point to reports from the World Bank that reveals that the urbanisation in Africa is occurring without growth. The reports further note that these cities have come to symbolise the social and economic crises that have enveloped the continent. The aforementioned definitions of urbanisation subsequently bring to the fore the following characteristics of urbanisation: it involves the increase of populations (due to migration or increased fertility); and it is influenced by economic growth or industrialisation. These characteristics have been witnessed in the urbanisation process of Riyadh as will be discussed in subsequent sub-sections.

Within the global context, urbanisation rates are increasing as the proportion of urban population continues to increase in contrast to that of rural populations. In its *2018 World Urbanisation Prospects* report, the United Nations Department for Economic and Social Affairs (UNDESA) provides statistics that reveal that urbanisation has rapidly increased as projected in the 1950s. As at 2018, 55% of the world's population was residing in urban areas compared to the 1950s when 30% of the world's population was urbanised. Furthermore, the proportion of the world's urban population is projected to increase to 68% by 2050 (UNDESA 2014). Within the Asian region – which encompasses KSA – the urbanisation rates have reached 50%; this is lower than other regions, such as Northern America (82%), Latin America and the Caribbean (81%), Europe (74%) and Oceania (68%). Nonetheless, Asia constitutes 54% of the total world urban population with the number projected to increase by 2050 (UNDESA 2014).

1.1.2. Sustainable urbanisation

Sustainable urbanisation was borne out of the realisation that cities were the main source of land, air and water pollutions. Furthermore, compared to the rural areas, urban areas were the major consumers of energy, food and natural land. According to Lin and Yang (2006), the concept of sustainability was first incorporated into urban growth and development in 1980 in the declaration by the United Nations Environment Program (UNEP), World Wildlife Fund (WWF) and the International Union for the Conservation of Nature and Natural Resources. Consequently, various definitions of a sustainable city have emerged. Abdullahi and Prandhan (n.d.) describe a sustainable city has one that considers the environmental ramifications of its development on the present and future generations. The two further note that a sustainable city is synonymous with minimal consumption of food, water and energy in addition to minimum levels of waste disposal, soil, water and air pollutions. On the other hand, Newman and Kenworthy (1999) reveal that within sustainable cities there is an inverse relationship between environmental impacts of urban activities and social equality/liveability. With regards to this relationship, the effects of urban development activities should be reduced whereas social equality and liveability should increase. One of the immediate impacts of urbanisation that has been witnessed in many urban areas is the conversion of forest and agricultural areas into areas for urban development projects. This has been the case in particular in tropical and developing countries (Abdullahi and Prandhan n.d.).

Sustainable urbanisation implies a form of urbanisation that occurs within the confines of sustainable development. It is a situation in which the urbanisation of towns and cities is cognisant of the protection of the environment as well as equitable employment, distribution of basic services, shelter, transportation and social infrastructure in the urban areas concerned (Al-Shihri 2013). Sustainable urbanisation or sustainable urban development betters the ecological and social

health of cities in the long-term (Al-Shihri 2013). Sustainable urbanisation is the product of a long-term vision that not only considers the need of the present urban population but also those of the future generation. The basic principles or cornerstones of sustainable urbanisation include the following: environmental; social and economic. Major issues around the social aspect of sustainable urbanisation comprise sound public participation, public health and safety, quality education and public awareness on sustainability as well as inclusion of minorities, persons living with disabilities (PWDs) and the poor. Conversely, the economic pillar of sustainable urbanisation includes enactment of green economy, equitable resource distribution, affordable housing, effective public transportation and relevant economic policies and regulations. The environmental pillar of sustainable urban development is centrally concerned with the maintenance of environmental quality, such as clean water and air quality. Other aspects of this pillar are the following: effective waste disposal and management; reduction of pollution; and natural resource conservation.

Of the three pillars, environmental sustainability stands out as the principal concept of the sustainable urbanisation theory. Spatial segregation and urban sprawl have been the major cause of environmental problems insofar as urbanisation is concerned (Abdullahi and Prandhan n.d.). Examples of these environmental problems include depletion of non-renewable resources, environmental pollution, natural disasters, poor waste disposal, water scarcity and extinction of animal and plant species. The need for the economic pillar of the sustainable urban development concept is occasioned by the fact that haphazard urbanisation especially in developing countries has resulted in high wealth and income inequalities. Economic sustainability is additionally concerned with the development of human, man-made and knowledge capitals through sustainable means and materials. Social sustainability pays attention to how residents of the city behave within its physical environment (Abdullahi and Prandhan n.d.). Measures of social sustainability include residents' access to essential services, such as education, health, green and open spaces, employment opportunities, public transportation, housing and social segregation.

1.1.3. Urbanisation in the Gulf Region

Saudi Arabia is a member of the Gulf Cooperation Council (GCC), which comprises the countries of the Gulf region including the United Arab Emirates (UAE), Bahrain, Kuwait, Oman and Saudi Arabia. These countries are similar in the sense that they are desert countries that experience arid or semi-arid climate. As was the case with Riyadh, the urbanisation of most cities in the Gulf region was preceded by the existence of traditional societies whose way of lifestyle was predominantly nomadic. Ramadan (2015) reveals that the other economic activity pre-urbanisation was fishing along the coastal areas and inter-regional trade, mostly with India and other areas of

the world. The oil boom of the 1960s proved to be a pivotal point in the urbanisation of the region as it precipitated rapid economic development and subsequent expansion of the cities in the Gulf region. This economic growth has been evidenced by the fact that the Gulf region boasts the highest economic GDP per capita in the world (Ramadan 2015).

According to Ramadan (2015), this region is home to one of the fastest growing urban populations in the world. With a total population of 40 million, 67 percent of this population lives in Saudi Arabia. Furthermore, 70 percent of the total population in the Gulf region live in urban areas making the GCC one of the most urbanised areas worldwide. Kuwait and Qatar, in particular, are virtually 100 percent urbanised (Ramadan 2015). The major factors that have influenced the rapid urbanisation in the GCC include internal migration and international immigration of expatriate workers prompted by the economic prosperity in the region and subsequent employment opportunities. Ramadan (2015) further reveals that the urban populations of the GCC countries have continued to increase at a rapid rate compared to their total populations. Table 1-1 provides statistics on the population growth in GCC countries from 1970 to 2050.

Table 1-1: Population growth in the GCC region (1970-2050), Source: Ramadan (2015)

Country	Total Population			Average Rate of Population Growth	
	1970	2010	2050	1970-2010	2010-2050
World	3,685,777	6,908,688	9,194,984	1.58%	0.72%
Dev. Country	2,678,300	5,671,460	7,874,742	1.89%	0.82%
Arab Region	127,865	359,273	598,174	2.62%	1.28%
Bahrain	220	807	1,277	3.30%	10.15%
Kuwait	744	3,051	5,240	3.59%	1.36%
Oman	747	2,905	4,878	3.45%	1.30%
Qatar	111	1,508	2,316	6.74%	1.08%
Saudi Arabia	5,745	26,246	43,658	3.87%	1.28%
UAE	225	4,707	8,253	7.90%	1.41%
Total GCC	7,792	39,224	65,622	4.12%	1.29%

As it has been seen in the case of Riyadh, one of the major infrastructural developments occasioned by the rapid urbanisation in the Gulf region has been the expansion of the road network. This has been aided by the oil revenues been channelled by the authorities towards the construction of arterials in various neighbourhoods, high-capacity highways and extensive road networks. Ramadan (2015) provides the example of Jeddah, which boasts a road network spanning 564 km of which 100km consists of freeways. In Riyadh, in particular, the average percentage area occupied by the road network was 35% as at 2014 (UNHABITAT 2018). Furthermore, the density of the arterial roads had increased within the same period compared to pre-1990. Consequently, urbanisation in the countries in the Gulf region has taken a similar turn in the form of increased

car ownership. Apart from the expansive road network, the availability and affordability of fuel has been an influential factor in the increased car ownership. Ramadan (2015) observes that the high rate of car ownership in the region rivals that of other high income countries, which has subsequently resulted in the increase of vehicular trips within the same countries.

On the flipside, the rapid urbanisation in the Gulf region has brought to the fore the lack of affordable housing as a key challenge and negative impact of urbanisation. The increased urban population in these cities has resulted in an increased demand for affordable housing, which has not been met. The result has been a shortfall in housing within the Gulf region of which Riyadh has the highest shortfall of housing facilities compared to other cities (Al-Surf et al. 2013). The lack of affordable housing is attributable to an inefficient mortgage market that seems to favour the wealthy residents of the city at the expense of the poor. Al-Bassam (2012) reveals that only 30% of urban dwellers in KSA have their own homes.

1.1.4. Urbanisation in Riyadh

As the capital city of the Kingdom of Saudi Arabia, Riyadh has transformed into one of the megacities in the Gulf region since it was declared a capital city in 1900 by King Abdulaziz. From a tribal village of 12,000 people, the population of Riyadh had ballooned to approximately 6 million by 2016 (General Authority for Statistics 2016). Subsequently, the population of the city is projected to increase to 8 million by 2020 (Fig 1-1). From a tribal village whose chief economic activity was small scale agriculture and nomadic livestock keeping, Riyadh has metamorphosed into an industrial epicentre of KSA, which is one of the largest oil producers and exporters in the world. The oil boom was influential in the urbanisation of the city as the revenues generated from the exportation of oil were used to fund infrastructure projects, including the construction of health and education facilities. Consequently, the transformation of Riyadh into an economic hub attracted migrants from rural areas as well as from other countries who moved into the city in search of employment opportunities. This is synonymous with the trends witnessed in other cities insofar as urbanisation is concerned. McGranahan and Satterthwaite (2014) note that there is a link between rural-urban migration and economic growth in the urban centres. People tend to migrate where it is economically advantageous as was the case for Riyadh when the oil boom provided it with revenues for infrastructural development and provision of essential services.

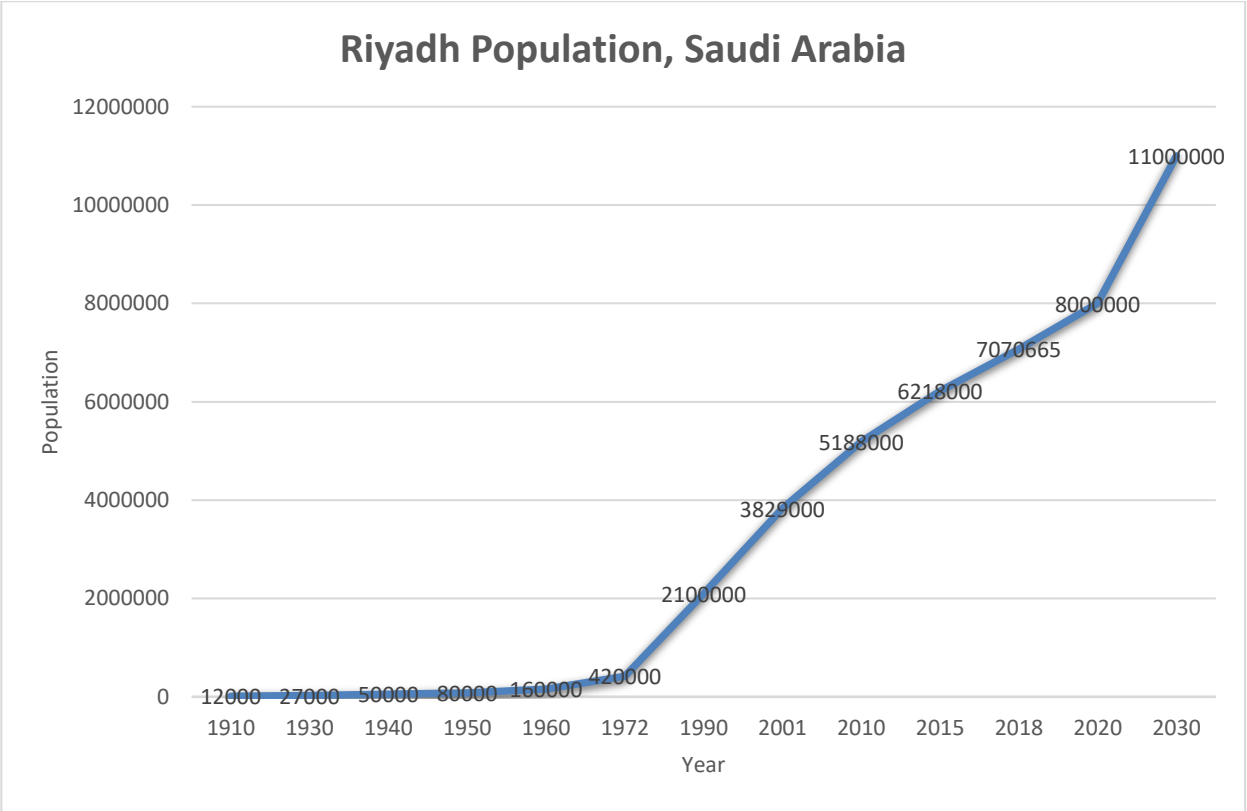


Figure 1-1: Population growth in Riyadh (1910-2030), Source: Researcher (2019)

1.1.5. Factors influencing Urbanisation in Riyadh and other KSA cities

- Population increase

One of the key social factors that have contributed to the rapid urbanisation of Riyadh as well as other KSA cities has been the increased urban population. From a population of approximately 80.000 people in the 1950s – when it was still a traditional society – the population of Riyadh had increased to approximately 7 million by 2018. As more people migrated to the city, the urban boundaries of Riyadh expanded in response to the need for housing and other facilities to serve the needs of the increasing population. In view of the increasing urban population of the city, the first Master Plan developed by Doxiadis Associates in 1968 advocated for an open-ended pattern of urban planning that would enable Riyadh to expand dynamically to accommodate the increasing population (Doxiadis 1968). As the population of the city hit the 1 million mark by the 1970s, Riyadh continued to urbanise as evidenced by the high number of building permits that were issued during that period. In addition to permits issued for the construction of medical facilities, airport and universities, the local authorities issued approximately 12,000 building permits per annum for the construction of residential and commercial properties (Al-Hathloul 2017).

Additionally, responsible for the increased urban population is the improved fertility rates and the reduced infant mortality rates as a result of improved access to healthcare services. Benna et al (2016) note that the infant mortality rates have generally reduced in KSA from 39.7 deaths per 1000 live births in the 1990s to 18 deaths per 1000 live births in the 2000s. This number is projected to decrease to 7.2 deaths per 1000 live births by 2050; a further indication that the urban population will continue to increase. Apart from the reduction of infant mortality, improved healthcare provision has increased the life expectancy for Saudis in general. The current life expectancy of 74.1 years has ensured that the population of the country increases as well as its urban population (Benna et al. 2016).

- Political elite

Urban growth in Riyadh and KSA in general has been influenced by powerful political forces in the central government – most notably in the royal family – who determine the distribution of resources to different areas in KSA to aid in urbanisation. According to Benna et al. (2016), in addition to members of the royal family, these political forces encompass market forces, public business interests and certain resident population who influence the relocation of administrative functions and public development projects in major towns. In the case of Riyadh, its journey to becoming a megacity in the Gulf region began with King Abdulaziz's decision to establish it as the capital city of the newly founded Saudi Arabia. Afterwards, many of the administrative functions were relocated to the city and many government buildings and houses for civil servants were constructed (Al-Hathloul 2017). The political elites were also able to influence the move from Islamic architectural designs to more westernised forms through the use of villa designs for the construction of government houses. Consequently, the use of the villa design gave the notion that it was the preferred architectural design for the construction of residential properties in Riyadh (Al-Hathloul 2017). This architectural design was later adopted by realtors and also incorporated in the first Master Plan developed by Doxiadis Associates.

The political forces have further influenced the formulation of policies that favour urbanisation in certain areas. One such policy was the land grant policy that saw many residents in Riyadh, Jeddah and Dammam access thousands of parcels of land for residential purposes; the aftermath was an enormous expansion of the aforementioned cities beyond their urban boundaries (Benna et al. 2016). In addition, many of the political elites own real estate companies through which they build residential and commercial properties that are without the cities' designated urban boundaries. Benna et al. (2016) provide the example of Dammam Metropolitan Area whose urban boundaries

have extended into the Arabian/Persian Gulf as a result of land-filling by realtors to find more space to build properties.

- Economic forces

The concentration of economic activities in the five major cities of KSA has attracted many internal and international migrants to these cities in search of employment opportunities. Benna et al. (2016) reveal that many of the industrial cities established by the Saudi Industrial Property Authority have been located in the five major cities of Riyadh, Jeddah, Makkah, Madinah and Dammam. It is no wonder that these cities have attracted the largest number of migrants from rural areas in Saudi Arabia as well as international migrants from other countries. Three quarters (approximately 76 percent) of the 14 industrial cities – excluding independent industrial cities, such as Jubail and Yanbu – are located in the aforementioned five major cities. Consequently, the concentration of these industrial cities has fuelled spatial inequalities between different cities or areas in KSA. Most of the internal migrants hail from rural areas where there is minimal industrial activities and thus, minimal chances of accessing employment opportunities. On the flipside, the over-concentration of industries in these areas has resulted in increased environmental degradation, traffic congestion, continuous urban sprawl and traffic congestion.

Furthermore, most of the effects of the economic growth of KSA have been manifested or felt in the urban centres. Considering that it is home to 18% of the world's oil reserves, Saudi Arabia has achieved an economic growth of 3% for many decades (Benna et al. 2016). Consequently, most of the revenues realised from oil exports have been channelled towards the development of urban centres as opposed to the rural areas. Garba (2004) notes that in the aftermath of the oil boom of the 1970s, Riyadh witnessed a flurry of infrastructural development, which continued to attract many rural outmigrants to the city. These infrastructural development projects were sources of employment opportunities for many people due to the labour required. After the completion of these infrastructural projects, many of the workers chose to settle in Riyadh and continue their search for more employment opportunities. Their decision to settle subsequently created an increased demand for housing, which encouraged many real estate companies to invest in residential properties to meet this demand. It was not only the internal migrants but also the influx of international migrants that created an increased demand for housing.

1.1.6. Consequences of urbanisation in Riyadh

As has been witnessed in the case of Riyadh and other major cities in KSA, that urbanisation has come with its fair share of challenges. The most notable of these challenges is urban congestion and urban sprawl occasioned by the increase in the urban population. McGranahan and

Satterthwaite (2014) warn that the urban sprawl and urban congestion are products of poor management of the increased urban population by the urban authorities. This has been the case in Riyadh – as well as in KSA – as urban authorities have found themselves overwhelmed by the rapid urbanisation rates in the city. The comprehensive plans developed in the aftermath of the oil boom of the 1970s become redundant as Riyadh experienced a rapid urbanisation that increased the demand for essential services, such as water, transport, sanitation, affordable housing and energy among others (Benna et al. 2016). From a deeper perspective, these management challenges insofar as urban congestion and urban sprawl are concerned, have arisen from the lack of technical expertise of the urban planning authorities. A review by the Future Saudi Cities Programme (2016) subsequently noted that many urban planning authorities in KSA cities are not knowledgeable on the latest technologies for urban planning, such as the Geometric Information Systems (GIS).

Subsequently, the urban congestion and urban sprawl that has been experienced in Riyadh – and generally in other KSA cities – has culminated in other consequences or challenges. One of them is inadequate infrastructures and basic services, such as road networks and housing. Riyadh's low population density in particular has complicated the provision of essential services to dispersed residential areas resulting in several residential properties that lack health care, roads, educational facilities and water, among others (Benna et al. 2016). The distribution of these services to such sparsely populated areas often comes at huge financial costs. For instance, distribution of health care facilities is skewed towards the central district compared to the outer districts in the Governorate where there are fewer facilities forcing the residents in these areas to travel long distances before they can access these (Mansour 2016).

Urban congestion and urban sprawl also results in increased traffic congestion and road accidents. In Riyadh, the increase in urban population has resulted in persistent traffic jams that cause many residents to waste a lot of hours on the roads. The fact that Saudi Arabia is a key exporter of oil has resulted in the affordability of private cars for many residents. As at 2016, the rate of car ownership in the city was 219 per 1000 persons (Benna et al. 2016). The increasing car ownership has subsequently contributed to road accidents making KSA one of the leading countries in the Middle East region insofar as road accidents are concerned. The traffic congestions, which often peak in the morning and afternoon hours, are often manifested in the form of wrong parking, poorly functioning traffic signals, reckless driving and congested corridors. Consequently, the dependence on private cars as the mode of transportation has impacted negatively on the walkability culture in Riyadh. Over the years, urban authorities have paid more attention to expanding the road network as a way of alleviating the traffic congestion rather than increasing walkability to encourage more Riyadh residents to take up walking as a healthier mode of transport

(Ledraa 2015). Indeed, with the exception of traditional inner neighbourhoods in Riyadh, the neighbourhoods with minor residential streets perform poorly insofar as walkability is concerned because most of them lack sidewalks that can enable residents to walk safely without the danger of being involved in road accidents.

Another consequence of urbanisation, especially in developing countries, is increasing income inequalities. This is apart from the income inequalities that exist between rural and urban residents within a national territory. McGranahan and Satterthwaite (2014) note that an increasing share of poverty levels worldwide are becoming concentrated in urban areas. In Riyadh and other major cities in KSA, the increasing urbanisation has resulted in high unemployment levels that have metamorphosed into income inequalities between the haves and the have-nots (Benna et al. 2016). Particularly affected in this regard are the youths and migrants who have to grapple with an overcrowded labour market consisting of international migrants who have been similarly attracted to the economic growth of Riyadh and KSA in general. Subsequently, the unemployment results into increased poverty, anger and proliferation of social ills. Al-Khateeb (2015) warns that the increasing unemployment rate may be frustrating for many of the Saudi youths who may resort to criminal activities. Furthermore, the urban planning authorities' inability to efficiently manage the needs occasioned by increased urbanisation may perpetrate spatial inequalities within urban centres. Certain parts of the urban centres may subsequently enjoy better access to essential services compared to other regions. Benna et al. (2016) cite the example of Riyadh where certain areas of the city do not have adequate access to electricity, telecommunication services, paved roads and water and sanitation facilities. Spatial inequalities within cities subsequently lead to lack of social cohesion as the residents become divided or segregated along the lines of income or origin.

As has been witnessed in Riyadh, another side-effect of rapid urbanisation is environmental degradation. McGranahan and Satterthwaite (2014) provide the example of 19th Century North America and Europe where urbanisation occurred at the cost of unhygienic environmental conditions that culminated in deadly outbreaks of cholera and waterborne diseases. This situation was worsened by the infestation of fleas and rats that provided the platform for the spread of deadly plagues. Although not as worse as the environmental challenges witnessed in 19th century Europe and North America, Riyadh has also witnessed its fair share of environmental challenges in the course of its urbanisation. Rapid urbanisation in KSA cities have generally occasioned a decreased quality of life manifested in the form of contagious and gastrointestinal illnesses as well as decreased air quality (Benna et al. 2016). Particularly in Riyadh, the increase in population has occasioned an increase in the amount of municipal solid waste, including electronic waste that the

municipal authorities have struggled to dispose of. The link between increased car ownership and increased air pollution is also directly proportional as many cars emit harmful gases into the air. Poor residents of the city have unfortunately bore the brunt of the increased environmental degradation. Globally, low-income residents in cities are often the most affected by the environmental challenges occasioned by urbanisation, including climate change.

1.2. Sustainable urban development

1.2.1. The concept of sustainable development

The concept of sustainability and sustainable development was borne out of the realisation that the increasing worldwide population was occasioning a rapid depletion of the earth's natural resources. Al-Shihri (2013) reveals that people are increasingly demanding more and better products that are in turn creating increased pressure on the environment or natural resources. These concerns prompted the 1972 United Nations General Assembly (UNGA) conference on environment and sustainable development in Stockholm, Sweden. One of the resolutions of the conference was the need to safeguard environmental quality as a critical human right; the conference participants further undertook to protect the environment for future generations (Al-Shihri 2013). The first definition of sustainable development was provided in 1983 by the Brundtland Commission – formally known as the World Commission on Environment and Development. It described sustainable development as one that meets the present generations' needs without negatively impacting the ability of future generations to meet their own needs (Brundtland 1987). The concept of sustainable development was further expounded on in subsequent conferences. At the World Summit on Sustainable Development (WSSD), which was held in 2002 in Johannesburg, the delegates listed two main tenets of sustainable development. One of them is an integrated policymaking process at the national, local and regional levels to enhance sustainable development. Another one was the presence of systems to enhance sustainable development, such as energy efficiency, limited urban sprawl, affordable rides, public transport networks, orderly land use, reduced pollution, reduced congestion, improved health and improved infrastructure. Amidst the discussions on sustainable development, various definitions of sustainability numbering approximately 70 definitions have emerged over the years from different academic fields (Al-Shihri 2013). One of the most notable definitions is from H.E. Daly (1991) who describes sustainable development as one in which the consumption of renewable resources does not exceed their regeneration rates and that the extent of pollution does not exceed the corrective capacity of nature.

Sustainable development is hinged upon three key pillars on which urbanisation can reap a lot of dividends for residents of cities undergoing rapid urbanisation. These three dimensions or pillars include economic sustainability, environmental sustainability and social sustainability all of which have to co-exist in harmony. McGranahan and Satterthwaite (2014) note that cities that are cognisant of these dimensions will realise a lot of opportunities from urbanisation. They further point out that maximising on these dimensions is better than policies in developing countries, which seek to curtail rural-urban migration. In other fora, these three pillars of sustainability have been described using three synonyms: people (social sustainability); profit (economic sustainability); and planet (environmental sustainability) (Al-Shihri 2013). In its Sustainable Cities Index, Arcadis (2016) lists several indicators of social sustainability, such as health (obesity and life expectancy); work-life balance; dependency ratio; living costs; housing; and income equality. On the other hand, the indicators of environmental sustainability (planet) include energy consumption, renewable energy share, natural catastrophe risk, air pollution, greenhouse gas emissions, green space, composting rates, drinking water, waste recycling and sanitation. Economic sustainability (profit) looks at the economic impacts of urbanisation including GDP per capita, ease of doing business, infrastructure (traffic congestion), mobile and broadband access and global economic networks.

1.2.2. Sustainable development in Riyadh

The 2016 Sustainable Cities Index provides the latest picture of Riyadh's progress insofar as sustainable urban development is concerned. The aim of the index is to examine the viability of cities as places to reside, their environmental impacts as well as their financial stability (Arcadis 2016). It does not only look at each of the pillars of sustainable development in isolation but also examines how these pillars complement one another insofar as sustainable development in cities is concerned. The 2016 edition examines and ranks 100 cities worldwide based on their performance on the three dimensions of sustainability. Within the Middle East region, Riyadh was ranked 6th overall – one place ahead of Jeddah – and 76th worldwide. The city's best performance was in social sustainability owing to the low crime rate in the city, relatively balanced dependency ratio and relative affordability. Riyadh also performs well on the economic sustainability dimension largely because of its expansive telecommunications networks and the fact that it is majorly free from exposure to natural disasters (Arcadis 2016). This is notwithstanding the fact that it could improve on certain indicators of economic sustainability, most notably, the transportation infrastructures. However, it performs dismally on the environmental sustainability dimension due to a number of factors/indicators. These factors include low percentage of green space, high energy consumption levels and increased emission of greenhouse gases (Arcadis

2016). These environmental challenges have also affected Jeddah – the second largest city in KSA – which unlike Riyadh is highly vulnerable to floods. Furthermore, the city – ranked 81st overall on the index – faces challenges with its transportation infrastructure and the ease of doing business.

1.2.3. Key Research Gaps and Questions

The picture painted of sustainability is that it is a concept that cities in the developed and developing cities should integrate in their urban development projects. It has become necessary in the face of projections – as aforementioned – that the urban population will continue growing in the coming years. However, as attested to by cities that have already moved to ingrain sustainability in their development projects, various challenges and barriers exist to inhibit the success of this process. It is worth noting that cities differ from one another in terms of sociocultural backgrounds, political systems, natural resources, demographics/population size, climate and historical factors. Such differences will affect the experiences that different cities undergo with the integration of sustainability in their urban development. What are the barriers that a city in one geographical region experience compared to another one in a different geographical region? How will a city's experience with urbanisation influence its ability to integrate sustainability in its current urbanisation process? How will a city's cultural and religious background facilitate its sustainable urbanisation process? These are some of the issues that have been covered in this research to understand the experiences of Riyadh as a desert city in achieving sustainable urbanisation.

1.3. Formulation of the Research Question

The preliminary research was influential in narrowing down the focus of the research and identifying research gaps that could be inculcated into a specific research topic insofar as sustainable urbanisation in desert cities is concerned. An important consideration when narrowing down the research topic is the target audience of the study. In the case of this study, the researcher undertook a stakeholder mapping to identify the stakeholders who would be impacted by the findings of the study. These stakeholders included academics and researchers, urban planners in the central and local government of KSA and Riyadh respectively, and Riyadh residents, among others. The preliminary research further helped the researcher develop preliminary questions, which were open-ended (how and why). The questions were based on the information that was identified during the research as well as the knowledge gaps.

1.3.1. Research Questions

After the evaluation of the research questions developed during the preliminary research, the following research questions were developed:

- What are the barriers and drivers to sustainable urbanisation in Riyadh, and what are the challenges for planning for SU in Saudi Arabia?
- What are the economic, social and environmental factors affecting sustainable urbanisation (SU) in Riyadh?
- What are the key components of a SU framework for future development of urban areas in Saudi Arabian cities?

1.4. Aims and Objectives of the Study

1.4.1. Aim

The aim of the study is to explore and understand the factors that enhance and inhibit sustainable urbanisation in desert cities, with Riyadh as the case study.

1.4.2. Research Objectives

- To identify and examine the economic, social and environmental factors of sustainable urbanisation (SU);
- To examine the drivers and barriers to sustainable urbanisation in desert cities, such as Riyadh;
- To identify the challenges in planning for sustainable urbanisation in Saudi Arabia;
- To propose a sustainable urbanisation framework to inform future development of urban areas within Riyadh and other desert cities.

1.5. Rationale for the Study

That the world is becoming increasingly urbanised is a fact that has been confirmed by statistics. UNDESA (2018) projects that the world's urban population will increase to 68% by 2050, up from 55% in 2018. Riyadh epitomises this increasing urban population worldwide considering that its population is projected to increase to 10 million by 2050. This population increase is attributable to the presence of investment opportunities in the city, which has attracted numerous expatriates keen to set up business as well as internal migrants from the rural areas who come in search of employment opportunities to better their lives. Despite its rapid urbanisation, Riyadh has encountered numerous challenges emanating from the increased urban population, including lack of affordable housing, environmental degradation, overconsumption of resources (e.g. water and energy), increased spatial inequalities, increased unemployment, inadequate public infrastructure and facilities as well as improper land use. These challenges have been compounded by outdated

policies on urban planning that are not reflective of the reality and thus cannot steer the process of sustainable urban planning. It is noteworthy that sustainable development is a key pillar of the National Transformation Plan (NTP) 2020 and Saudi Vision 2030. However, these efforts may not bear fruit if there is no empirical evidence that identifies the issues that will emanate from sustainable urban planning. This research is necessary to identify the barriers that will hinder sustainable urbanisation in Riyadh as well as the opportunities for the same. By identifying these challenges, stakeholders of urban planning will be better prepared by developing strategies to overcome the challenges while exploiting the opportunities presented by sustainable urbanisation.

1.6. Methodological Approach

The research adopts a qualitative approach, because unlike the quantitative approach, the qualitative inquiry provides a means of research that describes a concept based on the perspective of informants uncovers multiple realities and establishes holistic comprehension of the research within specific contexts. The proper use of qualitative data as acquired from face to face interviews, document analysis, and field observations can help the researcher gain a better understanding of the problem. Using the qualitative approach, this research will be able to distinguish the skills, attitudes and knowledge pertaining to the phenomenon under study (Alyahmad and Saleh 2013). The adoption of a qualitative approach is further justified in the case of this study because it will provide the interviewer/researcher with the leeway to redirect the interview in accordance with the issues or new information that might be provided by the interviewee. Anderson (2010) reveals that the qualitative approach allows the researcher to revise the research framework as any new issue crops up. Considering that the study will involve interviews with a few individuals or respondents, the findings will not be generalizable to a larger population but will be transferable to other settings. In light of the findings, the study could thus be replicated in other KSA cities, such as Jeddah, Dammam and Mecca, among others.

The purpose of this methodology is to develop a framework that will inform the development of a sustainable community. This will be done through the development of sustainable urbanisation processes and strategies that will not only guide, but also be guided by a triangle of stakeholders – users, actors and the government. This research intends to explore, explain and describe the construction of a sustainable situation, as well as establishing sustainable development principles for both Riyadh and Saudi Arabia in general. Initial developments of the strategy framework will entail the use of a highly detailed literature review from research papers and studies conducted over the last 20 years. The interview results will be used to establish the key components and variables that formed the basis of the entire research.

The framework for development of this research study is based on the community's main interconnected objectives, that is, economic advancement, social integration, environmental sustainability, and good governance and security. As such, it will involve three main stakeholders, these are, residents, urban planning experts, and members of the local government. However, each of these four dimensions of sustainable urbanisation contributes towards the three stakeholders, all of which are crucial in ensuring both individual and societal wellbeing. Sustainable urbanisation has therefore been established on the first five factors: economic, social, environmental, physical, and political. Political factors are concerned with the enabling conditions for sustainable living and conditions, including transparency, the rule of law, effective urban services, participation, accountability, and adequate budgeting and financing of impending projects. In doing so, this framework will be highly effective in analysing sustainable development by focusing on key challenges, recognizing the gaps, and committing to any actions that are relevant in delivering and mainstreaming sustainable urbanisation in Riyadh.

Indicators of the framework therefore include:

- The increased identification and prioritisation of policy areas and strategies in which a sustainable urbanisation approach will add value, and facilitate progress towards new strategy aims
- Overall highlighting and promotion of existing sustainable practices that will support, correct, supervise and underpin sustainable urbanisation in general
- Increased policy integration, coordination, coherence and incorporation of a long-term perspective in decision making processes
- The setting out of government mechanisms in ensuring proper participation within the government and across all stakeholders
- Increased corporation of effective and adequate monitoring, improvement and learning in the framework process
- The setting out of concise measures, duties and timelines in implementation plans

1.7. Limitations of the Research

One of the limitations that this research encountered was the collection of data during the desktop study. Considering that most of the secondary data was collected via Internet searches, one of the challenges encountered was outdated information that was irrelevant to the research topic. Boslaugh (2007) notes that a key weakness of secondary sources of data is that some of the information collected may be irrelevant to the research questions as well as the research objectives. A lot of time was spent on sorting out information obtained online many of which turned out to be

irrelevant. The challenge related to outdated secondary data was notably pronounced in the case of statistics most of which were not useful to the study considering that they had been overtaken by circumstances. The challenge was overcome through physical visit to these statistical agencies – the General Authority on Statistics – to request for official publications and updated statistics on relevant issues.

Another limitation was the bureaucracy in the central government and within the Riyadh municipality. Many of the urban planning officials were hesitant to be interviewed for the study for fear of violating the protocol within their institutions and for fear of victimisation by their seniors. For them to agree to be interviewed for the study, most of them required that the researcher seeks approval from their departments – a process that was sometimes time-consuming. However, the challenge was overcome by assuring the urban planning officials that their identities would remain anonymous and that they could choose to withdraw from the interviews at any point they felt uncomfortable. This was in line with ethical procedures of the university. (See chapter 4).

A key limitation of the qualitative research methods, such as in-depth interviews and focus group discussions can influence the responses of the respondents. This occurs in cases where the researcher/interviewer is physically present during the interviews (Anderson 2010). There is also the danger of bias by the researcher in the interviews. To overcome this limitation, the researcher had to first assess his bias and interest in sustainable urbanisation in order to avoid the conflict of interest in the research.

1.8. Personal Statement

As part of its ambitious Vision 2030 and National Transformation Plan (NTP) 2020, the royal government of Saudi Arabia has earmarked the youth – who constitute majority of the population – as a chief cornerstone in propelling the country forward into the league of industrialised countries in the world. As a young Saudi citizen, I believe that I have an integral role in developing Saudi Arabia in all aspects, including economic, social, political, physical and environmental. Making a positive impact on the society around me has always been my lifelong desire. As a child, my ambition was to become a doctor to help alleviate those in pain by providing them with medical assistance. Although this dream did not materialise, my motivation remains to positively impact my society – in this case, the Saudi Arabian society. This research is the product of this motivation because the evidence collected from it will enhance the understanding on how to improve the urbanisation process by integrating sustainability practices. It is my hope that the evidence generated will contribute to the transformation of the Saudi society into a prosperous and

sustainable one that will not only benefit the present generation but also that which my children and grandchildren will be able to enjoy the fruits.

1.9. Structure of the thesis

This thesis is divided into 10 chapters each of which handles different aspects of the study. Chapter 1 provides an introduction to the study, including the research objectives, research questions and rationale. The introduction also briefly delves into background information on urbanisation in the Gulf region and in Riyadh, in addition to the concept of sustainable development. Chapter 2 is a literature review of previous studies and reports on the factors enhancing or inhibiting sustainable urbanisation in Riyadh. The chapter is sub-divided into the six parts (themes) harnessed from the three research questions. In Chapter 3, the researcher provides the context of the study by highlighting the history of urbanisation in Riyadh as well as the issues that have emerged during the urbanisation process. Chapter 3 further analyses various policy documents on sustainable urbanisation before highlighting the knowledge gaps identified thus far in the analysis of the documents. These include government documents and reports by international agencies on the state of urbanisation in Riyadh and the rest of KSA. Chapter 4 expounds on the methodological approach, including the sampling process, data collection, transcription and data analysis. This chapter also highlights the ethical considerations that the researcher adhered to before, during and after the researcher. Chapter 5 analyses the findings of the exploratory interviews that were conducted to pilot the questionnaire and identifies any issues that might emerge during the main study. Chapter 6 is an analysis of the main study interviews conducted with 30 Riyadh residents, 20 urban planning officials and 20 academics and researchers. Chapter 7 focuses on the development of a sustainable urbanisation framework based on the findings identified during the main study interviews with respondents. Chapter 8 highlights the process of verifying the findings of the main study and analysing the proposed SU framework, which was undertaken through 3 focus group discussions conducted with Riyadh residents (6), urban planning officials (3) and academics and researchers (3). Based on the recommendations made during the testing and validation of the proposed SU framework, chapter 9 focuses on the development of a final SU framework. Chapter 10 offers a raft of recommendations and general discussion of the issues identified in the study as well as conclusion.

1.9. Conclusion

The fact that Riyadh's urban population is projected to increases necessitates the integration of sustainable urbanisation in future development. This will enable it to overcome the challenges that have emerged as a result of the rapid urbanisation rate, such as urban sprawl, environmental pollution, traffic congestion, spatial inequality and inadequacy of public services. Nonetheless, integration of sustainability will be an exercise in futility so long as there is no empirical evidence that highlights the factors that will enhance sustainable urbanisation as well as those that will inhibit it. Thus, this research is a necessary step to understanding the state of urbanisation in Riyadh from different perspectives of residents, government officials and academics.

CHAPTER 2: SUSTAINABILITY AND SUSTAINABLE URBANISATION

2.1 Introduction

Sustainability is defined as being able to serve the needs of the future without compromising on future requirements of the environment or population (Brundtland 1987). Scholars admit that sustainability is a complex theory to apply in practice, despite growing familiarity with the topic (Choguill 2008). Different cities have attempted to establish working definitions applicable to their specific contexts so that it is applicable in real-world human settlement contexts. One of the objectives of this literature review and by extension, this study is to develop a working definition of sustainable urbanisation that takes into account the social and environmental demands of desert cities, with Riyadh as a case study.

Sustainable urban development has been integrated into global policy initiatives since the early 1990s and is embedded in international discourse, aiming to enhance domestic and local development strategies (Bulkeley & Betsill, 2005). Riyadh (like many other cities worldwide) is currently experiencing rapid population growth, accompanied by an expansion of the urban landscape. This expansion, therefore, requires careful consideration of the processes of environmental preservation and sustainability initiatives. The issue of sustainability has emerged at the forefront of urban planning initiatives, focusing particularly on the protection of current and future economic, social, and environmental interests (Jessop, 2002). However, the discrepancy between the available resources, goals, and cultures of developing nations, and those of fully industrialised countries, has precluded any meaningful discussion of sustainable urbanisation in the developing world (García, 2004).

The current process of urbanisation in Riyadh is clearly unsustainable. The process of rapid urbanisation has required the government to concentrate on individual needs, i.e. the demand for electricity has been satisfied for approximately 75% of the population, while road and dam projects have helped to satisfy the need for water. However, water is currently provided to only 25% of the population, with a 51% demand remaining from both Saudi nationals and international residents in KSA. Moreover, high water consumption incurs a considerable cost (Al-ulali, 2013), as is apparent when considering unplanned developments in Riyadh. Consequently, sustainable urbanisation is essential if the government and individual municipalities are to improve living standards (Al-Mulali, 2013).

2.2. Definitions

There exists a wide array of opinions on the meaning of urbanisation and sustainability. This section provides various definitions as discussed by scholars and urbanisation experts over the years. In addition, the section will review other explanations given by authors on urbanisation and sustainable development.

Urbanisation is one of the most important socio-economic phenomena of both the 20th and 21st centuries (Satterthwaite 2011; Lau 2012). Generally, urbanisation is understood to mean the movement of people from rural to urban areas or to more densely populated and developed regions (Houghton 1999; Allen 2009; Gober 2010; Burton 1997). It results in irreversible changes to production, and the environment, since much of the land is developed for industrial, manufacturing, and residential purposes (Friere et. al. 2012; Martin 2008; Redman 2006). People interacting with urban environments are often producers or consumers of the region and account for its development, pattern, and trends. However, it is not until recently that urbanisation has been examined through a sustainability lens (Montgomery et. al. 2004; Cetin 2010; Hall 2003).

Urban planning plays an important role in achieving sustainable urban growth and development, since the process enables stakeholders to put resources to better use (Al-Shuwaikhat, Aina & Rahman 2006; Belloumi & Al-Shehry 2016; Hu et al. 2015). Therefore, urban planning is understood to entail programmes, policies, and projects that integrate sustainable development principles. Ultimately, sustainability is conceptualised and understood differently, based on the needs of a specific urban area, and on the resources available in a region (Li & Ma 2014; Jiang et. al. 2014).

2.2.1. Key of Research Definitions

Table 2-1: Key definition of research terms

	Definitions	Year	Author	Comments or review for the definitions
Sustainable	Sustainability is defined as being able to serve the needs of the future without compromising on future requirements of the environment or population.	2008	Choguil	This is one of the acceptable views on sustainability

	Al-Hathloul observes, for instance, that "there are over 70 definitions for sustainability depending on the academic field and professional application in urban planning. Lately, sustainability is perceived through the lens of depleting natural and non-renewable resources, and therefore, emphasises on conservation and conscious urban planning."	2004	Al-Hathloul	Sustainability is a changing issue and can be examined from a scope of angles and subject areas.
	The 2002 World Summit on Sustainable Development (WSSD) that took place in Johannesburg set out the necessary actions governments and organisations had to include to achieve sustainability, and from this a variety of frameworks were built to ensure the same. The summit conceptualised sustainability within three principles: Environment, Economy, and Social Equity.	2013	Al-Shihri	In some of the earliest conceptualisations of sustainability in the 2002 summit, three issues came to light: human, economic and environmental. These principles have come to enshrine current definitions of the term sustainable.
Urbanisation	Generally understood as a shift from a predominantly rural to a predominantly urban society, it also represents major and irreversible changes in production and consumption	2009	Adriana Allen	The writer observes that whenever there is a new definition for urbanisation, it rapidly gains momentum and

	and the way people interact with nature.			widespread adherence.
	The cycle of urbanisation is the transition from rural to urban. In other countries where agriculture still dominates, such as China (46%), Pakistan (35%), Uzbekistan (36%), Somalia (37%), and Niger (17%), the cycle of urbanisation is in an accelerated phase, and the potential for future urban growth is high.	2010	Patricia Gober	The paper makes note of the fact that urbanisation is likely to negative impact natural resources such as water, because it leads to a high demand of this commodity. Therefore the author examines urbanisation through the lens of resource management.
	Urbanisation is very rapid in all Arab countries. Urban population is increasing at a rate higher than that of total population in almost all Arab countries. The percentage of urban population in Arab countries is expected to rise from 56% in 2001 to 66% in 2020.	2011	Abou-Korin	About-Korin defines urbanisation as a rapid mechanism, especially in developing areas such as the Arab gulf. His paper is statistical and examines some of the factors that influence

				urbanisation and growth as a result of the urbanisation process.
	The typical models of structural transformation explain urban expansion through the movement of labor from rural to urban areas that follow the transformation from agriculture to industry and services. Urbanisation would be a result of either a “push” from agricultural productivity growth or a “pull” from industrial productivity growth leading to “production cities,” with a mix of workers in tradable and non-tradable sectors	2014	Marie E. Friere, Somik Lall, and Danny Leipziger	The authors note that urbanisation is often accompanied by industrialisation and economic development, which increases productivity especially in manufacturing, leading to increasing services and proximity of activities and inputs.
	The urbanising process creates rapid and dramatic changes to landscape, resources and the environment on both a local and global scale.	2015	Zhang	Zhang (2015) observes that rapid urbanisation brings with it social and environmental problems that severely affect the distribution of resources, and with it, resource stability.
	Urbanisation has often been seen as a tool that enables economic growth, since cities	2015	Abou-Korin, Al-Shihri	Urbanisation is not just a process, it is also a tool that

	are social and economic engines that lead to the infrastructural development of a region.			enables economic growth, and social progress.
Sustainable Urbanisation	When sustainable urbanism is characterised in many contexts, what is usually addressed as the main concern is natural environment, and hence ecological sustainability, a condition that could be explained with the climate change, the inevitable environmental crisis.	2012	Oktay	The author examines the interplay between resources and urbanisation and how the process affects the distribution of resources.
Sustainable Urbanisation in desert cities	One of the facilitating factors to the desert city's growth is the use of no-interest loans. The no-interest loan, have enabled countless businesses and global firms to expand and develop as far as needed to make Riyadh an important capital city.	2001	Al-Hemmaidi	In this paper, the scholar examines what makes certain desert cities expand. In this case, when examining Riyadh, the scholar finds that no-interest loans on land are a large factor to growth.

2.2.2. Main Theories

To understand sustainable urbanisation in Riyadh and the issues revolving around it, it is first important to delve into the theories of urbanisation, which would provide an in-depth understanding of how urbanisation has evolved in Riyadh as well as other cities in KSA and the Gulf region. This study is based on a theoretical framework consisting of the theories of urbanisation as well as other urbanisation-related issues, such as rural-urban migration. Subsequently, the following theories are integral in understanding the phenomenon of sustainable urbanisation in Riyadh.

2.2.2.1. Modernization theory

This theory holds that urbanisation can only occur with the introduction of better technologies in the process of industrialisation. Developed in the mid-20th century by Max Weber, the theory posits that urbanisation and industrialisation are synonymous with one another but only if the latter is augmented by better methods of production. Kasarda and Crenshaw (1991) note that the application of modern technologies in industrialisation results in the concentration of populations in the specific cities at the expense of the rural areas. This is often the case in developing countries where the introduction of modern technologies to improve industrialisation in certain cities attracts rural migrants keen to improve their livelihoods (Bradshaw 1987). Coupled with high fertility rates, these urban areas eventually grapple with challenges in meeting the needs of the swelling population insofar as housing, social services, infrastructure and employment opportunities are concerned (Tipps 1973).

2.2.2.2. Rostow's Stages of Economic Growth/Development

Walt Rostow's stages of economic growth (Rostow 1953) provide a background to understand the history of urbanisation in Riyadh. Formulated in the 1960s, the model consists of the following: traditional society; economic growth; take-off, drive to maturity; and high mass consumption (Rostow 1953). At the traditional/pre-modern stage, the society is largely rural in nature with most of the people engaging in subsistence agriculture. The growth of the manufacturing sector is further inhibited by lack of scientific knowledge to develop the requisite technologies (Rostow 1953). The economic stage is characterised by increased growth of mining industries as well as capital use in the agricultural sector. Furthermore, the society experiences increased external investments in its industries as it gradually shifts from an agrarian society to a manufacturing/industrial one.

Also known as the economic take-off stage, this is symptomized by increased entrepreneurship and decreased involvement in subsistence agriculture. It is aided by robust political, economic and technological stimulus during which the factors inhibiting economic growth have been eradicated, such as cultural traditions (Rostow 1953). At the Drive to Maturity stage, modern technologies are extended to other sectors of the society whereas the society now produces locally what it used to import. The high mass consumption stage is characterised by increased employment in service sectors and high consumption of consumer durables. Other changes in a society experiencing this ultimate stage include a shift in the structure of the working force, increased per capita income and increased allocation to social activities.

2.2.2.3. Urban bias

According to the urban bias theory, government policies on development tend to be skewed in favour of certain regions in contrast to others (Tipps 1973). In most cases, development is

concentrated in the urban centres, which subsequently becomes a pull factor for people residing in the rural areas. Furthermore, underdevelopment of the rural areas has been engineered through the artificial price reduction of agricultural commodities that come from the rural areas (Kasarda and Crenshaw 1991).

2.2.2.4. Concentric zone theory

Also known as the Burgess model, this theory posits that urban regions are divided concentrically into different zones consisting of the following: Central Business District (CBD); transitional zone; working class zone; residential zone; and commuter zone (Meyer 2000). The CBD is the epicentre of the city and consists of the powerful and wealthy in the city. It is followed by the transition zone that is often a mixture of residential and commercial uses. After the transition zone is the working class zone or inner suburbs that are often characterised by ethnic neighbourhoods. Most of the people in the working class zone are low income individuals compared to those people who live in the subsequent zone (residential zone). The residential zone often consists of apartment buildings with quality infrastructures and facilities. The commuters' zone (outer suburb) is characterised by an invasion-succession process in which it is always at risk of being invaded by a spill-over from the residential zone. It consists of residents who work in the CBD and only come back home to sleep. Noteworthy is that this model has been criticised for only considering American cities and not other cities worldwide in which this model may be inapplicable (Meyer 2000).

2.2.2.5 Critical urban theory by Neil Brenner

Neil Brenner analyses and reinvents the critical urban theory from the perspective of Frankfurt School social philosophers by interpreting critical theory with regards to four interconnected elements. Brenner argues that the critical urban theory – originally conceived by the likes of David Harvey, Henri Lefebvre, Peter Marcuse and Manuel Castells – has determinate social-theoretical content (Brenner 2009). Subsequently, according to Brenner's critical urban theory, the current urbanisation processes occur via a disproportionate expansion of the urban fabric, which consists of different types of settlement spaces, infrastructural networks, investment patterns and land matrices. This is in contrast to the Fordist-Keynesian and competitive phases of capitalist development during which urbanisation amounted to the establishment and expansion of urban centres amidst daily social relations, political struggles and capital accumulation.

2.2.2.6. David Harvey's Urban Geography

The concept of urban geography was brought to the fore by David Harvey in his book Social Justice and the City published in 1973. In the book – divided into three parts – Harvey argues that urbanisation is a combination of spatial and social processes. Urban geography is largely

determined by differences in socioeconomic statuses in which poor people reside in the inner areas of the cities due to the high transport costs that they would incur by living in the suburban areas (Harvey 1973). In this regard, Harvey's observations differ widely from the aforementioned concentric zone theory (Burgess Model), which notes that it is the powerful and wealthy residents that reside in the inner core of the city. Furthermore, Harvey emphasises that the realisation of social equality and social justice within the cities is dependent upon the political processes and actors who will work to bring this aspirations to fruition.

2.2.2.7. Peter Hall's Enterprise Zone Concept

The enterprise zone concept is an urbanisation concept of developing industries in the poor and disadvantaged areas of the city. Formulated by Peter Hall in 1977, the concept is derived from the supply side economics theory that assumes that investors respond positively to minimal government regulation and tax incentives (Hall 1982). Under this concept, special economic zones are established in disadvantaged areas; in these zones, there are minimal government interventions as well as local, federal and state taxes or restrictions. The impact of these enterprise zones is that they increase job opportunities for residents of these disadvantaged areas by attracting many investors willing to set up businesses or industries in these places.

2.3. Research Gaps

Due to the unique and broad characteristics of this subject, it will be difficult to cover all areas related to Sustainable Urbanisation. A number of researchers have studied the process of urbanisation in KSA, but without focusing on the differences between rapid, and sustainable, urbanisation. Furthermore, there is a recognition that a number of other desert cities in KSA (including Jeddah and Dammam) have been subject to unplanned and rapid urbanisation, leading to environmental and health challenges (notably in terms of poor waste management) that have resulted in public health issues.

A gap in the literature has been identified during the preliminary investigation into this subject, that is, the existing literature focuses on natural hazards. Hence, the present study will discuss the broader social and environmental challenges in Riyadh that represent a barrier to sustainable urbanisation.

A new concept to be discussed in this current study concerns the typology of desert regions, such as Riyadh. This research will examine the issues surrounding review the drivers and barriers to sustainable urbanisation in desert cities, examine the social, environmental and historical factors influencing urbanisation, both in Riyadh and in KSA in general, and establish the relationship between sustainable urbanisation and environmental health and well-being in desert cities.

Furthermore, policy makers have failed to consider the needs of a growing population, resulting in a legislative gap, which has slowed the decision-making process of Saudi authorities. Therefore, the present study is considered to be beneficial to both the urban residents and the local government in general, and decision makers in particular, with the potential to guide national development strategies in response to social needs, so ensuring the future of sustainable development.

2.4. Approaches to Sustainable Urban Planning

It is generally agreed that urban planning plays an important role in achieving sustainable urban growth and development, since planning enables stakeholders to put resources to better use (Al-Shihri 2013). Urban planning is understood to entail policies, projects, and programmes that integrate sustainable development principles. The objective of urban planning is to plan and design urban areas. According to Wallin (2013), there are two key ways of responding to urban planning, the first focuses on the substance of planning, objectives, methods and outcomes of urban structures and the second involves placing an emphasis on the actors, processes and stages of planning.

2.5. Legislative Gaps in Sustainable Urbanisation

An apparent legislative gap that most governments are attempting to fill when instituting sustainability initiatives is the lack of public participation (Al-Shihri 2013). Prior to 1990 public engagement on planning initiatives in the Arabian Gulf was limited. However, in the early 1990s, in KSA, various systems were initiated to involve the public in decision-making processes pertaining to land use and urban planning. One such platform is the Shoura Council, which ensures, among other things that:

- Discussions are held to develop plans for the economic and social development of a region.
- Rules, regulations and international treaties are carefully examined to see their suitability to the development of KSA.
- Laws and legislation are interpreted to improve accessibility and application.
- Annual reports from ministries and government-affiliated organisations are discussed.

However, research reveals that these authorities have focused on Western models of sustainable urbanisation to develop their city. Such models are characterised by high-intensity urbanisation, capable of responding to current needs, but which fail to consider the long-term development of land and structure, along with the allocation of natural resources. This development is also characterised by high levels of rural-to-urban migration, as the population seeks improved facilities, opportunities and conditions within urban areas (McGranahan and Satterthwaite 2015). Aside from issues of overcrowding and pollution, such a model diminishes the ability to structure

an urban area. This has raised a number of concerns over such issues as unstructured planning, resulting in considerable levels of cost. At the same time, it has proved unfeasible to manage the needs of the population in this manner.

2.6. Characterization of Urbanisation in KSA

Urbanisation has often been seen as a tool that enables economic growth since cities are social and economic engines that lead to the infrastructural development of a region (Abou-Korin & Al-Shihri 2015). At the same time, the process encourages or worsens the problem of housing, and the provision of urban services such as waste management, water supply, and transportation.

One factor that has influenced the urbanising process in Saudi Arabia is the economy, which is dependent on oil revenue. Rapid urbanisation was predominant in the 1970s due to oil wealth, which encouraged government spending and the development of infrastructure such as housing and roads (Al-Shuwaikhat, Aina & Rahman 2006). A decade later, this trend declined due to a fall in oil prices, which made the government reconsider its expenditure. The government then came up with new themes to develop urban areas: employment, and the provision of development infrastructure. Environmental considerations were not a predominant factor during this time.

Nevertheless, scholars have noted that the social aspects of sustainability in KSA have made remarkable progress. With this in mind, it is important for authorities to see that the environment is an indispensable aspect of sustainable and strategic urban planning (Abou-Korin & Al-Shihri 2015), yet it does not prominently feature in the shaping of urban areas in KSA. Urban areas are unable to develop economically, socially, or technologically if they continue to rely on non-renewable resources. One means of achieving sustainability has been through environmental impact assessments, which came to the fore in the 1990s in the Arabian Gulf, as in much of the rest of the world. Nevertheless, within the global context, urbanisation in KSA is higher than in most of the populous Arab countries such as Egypt, Iraq, and even Syria (Abou-Korin & Al-Shihri 2015).

2.7. Monitoring Urban Development and Land Use

Urban encroachment due to fast-growing cities in the Arabian Gulf has led to land use challenges. Cities in KSA such as Riyadh and Dammam have developed to become metropolitan areas in need of more land. According to Abou-Korin and Al-Shihri (2015) urbanisation has led to unsustainable land impacts brought about by the alteration of the natural environment to accommodate increasing populations. Land formerly used for agricultural purposes has been altered to suit other urban land uses such as industrial, commercial, transportation, recreational and institutional activities. An observable trend along the Arabian Gulf shore is the land reclamation activities aimed at expanding

development areas. Such strategies as explained by Abou-Korin and Al-Shihri (2015) are unsustainable, destroying marine life in the waters of the Arabian shores which may create future food shortages.

Rapid urbanisation is also creating a number of long-term issues, i.e. chemical waste materials produced by industry damage the ecological system, which, in turn, affects land typology. A number of researchers have concluded that, in the near future, the land will be considered unfit for use, and that pollution will lead to an increase in health-related issues.

2.8. Riyadh's Growth and Expansion

Assessments of land use in Riyadh have consistently been carried out through satellite imagery followed by image classification. Aina, Merwe & Alshuwaikhat (2008) observed, however, the need to improve the accuracy of classified images in order to produce accurate portrayals of the rate of urban development and land use changes in Riyadh to facilitate sustainability initiatives. Aina, Merwe and Alshuwaikhat (2008) observed that a variety of methods have been devised to develop image classification in order to enhance research focus on land use and development. One of these methods is band rationing, which detects land use changes through mapping (Aina, Merwe & Al-shuwaikhat, 2008: 52). While it is a straightforward method, it requires the researcher to manually input image bands and to identify thresholds prior to producing images. Another advantage is that band rationing produces a classification algorithm, which is helpful for empirical observations. In a semi-arid environment like Riyadh, Aina, Merwe and Alshuwaikhat (2008) recommend the use of band rationing and they examined how images from band rationing can be used to formulate urban growth theories specific to Riyadh. They argued that the city's urban growth and increased land usage needs to be monitored to ensure sustainable urban development (Aina, Merwr & Al-Shuwaikhat, 2008: 52).

The images the researchers analysed demonstrated that Riyadh's urban extent has increased from about 24 square kilometres in 1970 to about 700 square kilometres in 2005 (Aina, Merwe & Al-Shuwaikhat, 2008: 55). This exponential pattern is attributed to leap-frog development that has seen some of the land remain empty for long periods of time and irregular subdivision of other parcels of land, without clear designation of their application (Aina, Merwe & Al-Shukwaikhat, 2008: 55). At the same time, land use and building control regulations and systems applied since 1976 have facilitated sprawl in Damman Metropolitan Area (Abou-Korin & Al-Shihri, 2015: 55); however, there have been various instances when these regulations have been waived, which has compromised land use and urban development. This explains the patterns observed in the study by Aina, Merwe & Alshuwaikhat (2008) as well as the irregularities in land use prevalent in Riyadh.

2.9. Sustainability Initiatives, Needs, and Challenges in Riyadh

Choguill (2008) observes that Riyadh is one of the most interesting cities in the Middle Eastern region on account of its development pattern, and for this reason, there is no definitive answer as to whether it is a sustainably planned city. The city has notable accomplishments in terms of socio-economic growth; however, this has come at the cost of its environment and resource distribution. Among these notable achievements is an increase in income and production in the last two decades, an increase in social amenities and public facilities including hospitals and access to sanitation, a drop in illiteracy rates and an increase in life expectancy (Choguill 2008).

While the government has attempted to solve some challenges created by urban sprawl in Riyadh, an observable trend in the city is the segregation of non-nationals (Gamboa 2008). As of 2010, the estimated population of non-nationals in Riyadh was 1.9 million while nationals were 4.5 million (Salam, 2013). Riyadh was, therefore, the second largest city hosting non-nationals in KSA. However, Gamboa (2008) argues that the city's culture is segregated along lines of income and origin. The city contains employer-owned housing projects which accommodate low-income employees. Non-national workers receive considerably less income compared to their Saudi counterparts. In addition, the segregation between high-income and low-income families was created when the city was giving parcels of land to people. Low-income families which tend to be large in size were offered smaller plots of lands relative to the high-income families. This action created housing zones based on income level thus creating a discontinuity of the Muslim community framework.

Nonetheless, the literature highlights that there are a variety of sustainability initiatives ongoing in Riyadh, especially in light of its anticipated population growth and the need to plan for current and future needs in mind. So far, urban growth management has been controlled by the Riyadh Development Authority, which has been charged with curbing exponential growth as a means of ensuring sustainable development of the city (Aina et. al., 2008: 51). Alshuwaikhat and Aina (2005: 387) observed that the Saudi government has made efforts to incorporate sustainable development principles by establishing frameworks that consider the environmental consequences of urban development activities.

Husain and Khalil (2013: 205) proposed that a holistic sustainability initiative integrates the use of database tools and conducting research on database development, emission monitoring and modelling of both stationary and mobile sources. Such technologies would have to be cost-effective and should apply multi-criteria decision-making (MCDM) tools (Husain & Khalil, 2013: 200). Monitoring should be at both a municipal and national level and the information integrated

into a central repository for review of policies and to note the impact of sustainability policies (Hussain & Khalil, 2013: 205). Different elements in the environment including air, water resources and land, should undergo monitoring, research and modelling.

2.10. Sustainable Urbanisation for Health and Environmental Well-Being

One of the first issues associated with urbanisation is the resultant pollution, and mismanagement of resources, which leads to a decline in environmental quality. The impact of human activities on ecosystems is a rising concern in urban planning and sustainability due to the importance of the environment in ensuring the survival of future generations. According to Martin (2005), human activities alter the biogeochemical and ecological processes of the global environment with cities and urbanisation playing a significant modifying role. For this reason, governments in collaboration with other institutions should ensure the sustainable management of urban areas to protect the environment. Similarly, the WHO believes that an emphasis needs to be placed on the environmental concerns, under economic and social frameworks (WHO, 1997).

Choguill (2008) noted that overall sustainability is achieved through the integration of social, economic and environmental aspects of an urban system. In respect to the environment and sustainability, the issue of renewable and non-renewable resources is a sensitive aspect of sustainable urbanisation. Cities in green environments do not experience challenges due to forests and foods which are self-maintaining and self-producing since they depend on the sun. However, desert cities face shortages in non-renewable resources such as water and fuels. Water, for instance, is considered complex since it is required to be replenished. For this reason, extraction of water from rivers and other sources should not surpass its recharge rate (Choguill 2008). These effects of urbanisation on the ecosystem, as explained by Bansal, Shrivastava and Singh (2015), have led to the deterioration in the quality of life and health. Volumes of uncollected waste and lack of efficient basic services create health hazards, poverty and a decline in the quality of life.

Accelerated urbanising movements in desert regions like Saudi Arabia have led to a deterioration in land and marine environments, which affects the ecological balance and well-being of surrounding populations (Abou-Korin 2011). Abou-Korin (2011) observed that such urbanisation has been characterised by apparent failure of existing planning and environmental regulatory systems that limit speculative rather than logistical urban development and this is a threat to terrestrial and aquatic environments. In Dammam Area, which is the focus of Abou-Korin's (2011) study, some of the negative impacts on both the terrestrial and aquatic environment include loss of greenfield and marine sites.

2.11. Social Justifications for Sustainability

Aside from being beneficial to environmental and natural resources, sustainability is important for social well-being and positive socio-economic development. Various scholars present strong cases for the social need to develop cities sustainably (Choguill 2008; Oktay 2012; Zhang 2015). When done well, sustainable development includes (Choguill 2008):

A- Help for the poor since they are often left with no better option that to destroy the environment through the misuse of non-renewable natural resources
B- The notion of cost-effective development using emergent economic criteria that do not compromise on productivity or degrade environmental quality
C- Health control, self-reliance and the application of appropriate technologies in development
D- The establishment of self-reliant development within the constraints of natural resources, especially non-renewable reserves and
E- People-centred initiatives and the increasing perception that human beings are also useful resources.

Oktay (2013) perhaps presents the most compelling social argument for sustainable development. The scholar suggested that progressive sustainability movements champion and envision a balance between human needs and natural resource capabilities. Increasingly, this is leading to human-empowered lifestyles that are less resource-intensive. Oktay (2013) strongly argues that the best initiatives take into consideration socio-cultural contexts since, ultimately, human beings are the ones utilising natural resources for their livelihood and so sustainable urban policies should be embedded in the need to contextualise development socio-culturally. Such models should take into consideration the expectations, behaviours and value systems of urban citizens.

Asheim, Buchholz, and Tungodden (2001) also present a compelling argument to justify the social importance of sustainability. The authors present sustainability as the main way to ensure that future generations can access natural resources and social amenities as those enjoyed by today's generation. Their argument is rather an ethical concern based on social theories of equity and fairness. In their study, the authors found that within a class of technologies, the only sustainable behaviour of the current generation can produce equal treatment and efficiency in the future. Thus, sustainability not only creates benefits for current individuals residing in an urban area but also creates future sustainability through the elimination of adverse effects likely to be caused by present negligence.

2.12. Structure of the Organisation of Riyadh

The municipalities in Saudi Arabia form a single part of the local governing body, which entails the Amara Governate, and the local units as controlled by their relevant central ministries. As such, the management of urbanisation is not solely exercised by municipalities alone, despite the fact that they undertake a large fragment of those responsibilities. As indicated in Figure 2-1, in the overall structure organisation of Riyadh, there are cross-cutting agencies and ministries, such as, the HCDA (High Commission for the Development of Riyadh), and the executive ADA (Arriyadh Development Authority), which works in support of the HCDA (Althabt, 2014).

At the municipal level, the prime objective of the governor and his staff members is to govern the region in accordance with the regulations and public policy of KSA. Their responsibility, therefore, entails order and stability, the maintenance of public security, the assurance of people's freedoms and rights, and the proper promotion of sustainable economic and social development in Riyadh. This is done in conjunction with the regional council, provincial council, and the head of the centre (Head of Markaz) (Althabt, 2014).

However, the organisational structure of Riyadh does not contain any fiscal separations between the municipal and central governing bodies. As such, the government spending on municipal infrastructure development, services, and local subsidies often amount to an average of 8% since 2003. The members of the municipal council, with the support of the sectoral ministries, such as health, and education, are required to perform the following functions (Althabt, 2014):

- Acquire all the resources availed to the municipality and determine how they can best be used.
- Link all development policies to the budget
- Set priorities for use, the source for additional funds, and solve all issues in municipal finance.

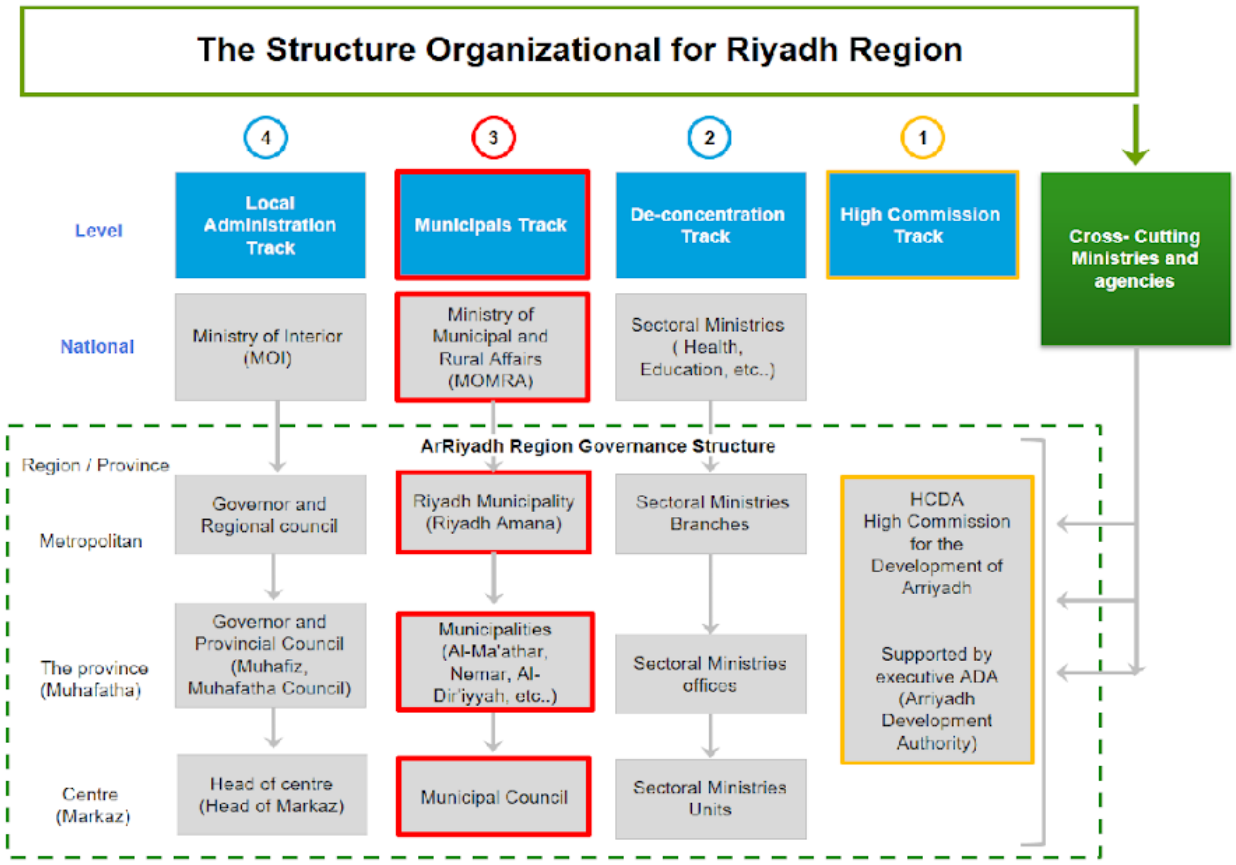


Figure 2-1: Structure of the Organisation in Riyadh, Source: ADA (2014)

2.13. Sustainable Urbanisation: A Review

A literature review is an important process in a research as it helps in refining the research topic by identifying knowledge gaps that could be explored by the study. This literature review focuses on the six research questions that guide this study. The questions have been framed in the form of themes or subtopics, which guide the literature search. The following sub-sections detail the issues – insofar as urban planning and development are concerned – that have been identified through the literature search.

2.13.1. Barriers and Drivers of Sustainable Urbanisation

2.13.1.1. Barriers of sustainable urbanisation

Previous studies have identified poor community involvement in urban planning and implementation as one of the factors that has hindered the take-off of sustainable urbanisation in Riyadh. Al-Surf et al. (2010) survey revealed that most of the Saudi public are not knowledgeable on sustainability and what it entails. Similarly, Bajaber (2017) notes that policy making in Riyadh and the whole of KSA does not usually involve the input from the public. This corroborates the sentiments of an earlier study, which points out that policies on urbanisation were traditionally made at higher levels of government. These policies were then passed down for implementation

by the local government never mind the fact that they were not necessarily influenced by the needs and demands of the residents at the grassroots (Garba 2004). As a result of poor community involvement in urban planning and implementation, the side-effects of rapid urbanisation in Riyadh have deteriorated. For instance, Al-Surf and Mostafa (2017) point out that many projects in Riyadh and KSA in general have not been environmentally conscious and healthier.

Additionally, several studies have highlighted the need to update Saudi Arabia's policies and legislations on urbanisation in order to put it on the path to achieving sustainable urbanisation. Future Saudi Cities Programme (2016) bemoans the lack of flexible policies that can help handle the challenges occasioned by the bulging population of Riyadh, which has been attributed to increase in fertility rates as well as internal and international migration to the city. Land allocation policies are an example of inadequate policies that have instead encouraged urban sprawl. In their study, Bidgood et al. (2017) noted that land allocation policies have created a situation in which there is a lot of land lying idle in Riyadh while speculators wait for the prices of land to rise. Furthermore, the government possess a lot of hectares of land that it could redistribute to allow for people to build more houses in response to the increasing demand for housing. Another urbanisation-related issue that needs updated policies and regulations is the housing sector, which has been one of the most affected by the rapid urbanisation in Riyadh. According to Al-Surf et al. (2013), the government's failure to enact regulations and issue guidelines on sustainable housing has inhibited the adoption of sustainable building materials in the construction sector.

Bajaber (2017) reveals that such poor policies and regulation have inhibited local government officials from fulfilling their obligations as far as delivery of services is concerned. Thus, it would seem that poor policies and legislations metamorphose into another barrier to sustainable urbanisation in the form of poor government implementation. Future Saudi Cities Programme (2016) points out that most of the policies and regulations do not clearly outline the responsibilities of the various agencies and officials involved in urban planning. Consequently, urban planning is characterised by a lack of coordination among the urban planners as the different agencies sometimes replicate their strategic objectives without sharing notes with one another.

Equally influential in constraining sustainable urbanisation in Riyadh is the high population growth that has been occasioned by the migration into the city as well as the increasing fertility rates. In both cases of internal and international migration, the migrants have been pulled to the city by the prospect of employment opportunities that they perceive to be in Riyadh compared to their origins. As at 2014, for example, the number of foreign workers had peaked at seven million in KSA, as a whole (Foran et al. 2014). Four years later, this number has increased to 12 million foreign workers (General Authority on Statistics 2018). Increased population growth – as a barrier

to sustainable urbanisation – is not only unique to Riyadh but to many other cities in the world, especially those in developing countries. According to Richards (1986), there is a significant increase not only in urbanization, but population as well. The rise in population occurs even in relatively land abundant and semi-arid areas, like, Gujarat and Rajasthan in India. His study reveals that there is a close relationship between the environment and population in dynamic and complex manners. He states that this relationship is strongly mediated by the number of cultural, socioeconomic, political and developmental aspect, whose roles also vary considerably from one context to the next (Richards 1986). Consequently, the rapid growth of human population is often characterized as one of the main factors influencing environmental degradation.

Population impacts the environment mainly through changes regarding industrial metabolism and land use (GAMEP 2017). While these two categories are not exactly mutually exclusive, they capture the vital process that influences a majority of environmental changes. This has been in the case with Riyadh where the increasing population has been proportional to environmental degradation. GAMEP (2017) for instance, acknowledges that the rapid urbanisation has been responsible for the increased municipal waste in the city. This challenge has been compounded by the increase in medical and electronic waste, the latter of which has been occasioned by the increasing adoption of digital technologies as Riyadh propels itself as a megacity. Waste output from even the smallest cities is starting to quickly overtax the absorptive capacity of the local aquatic and terrestrial ecosystems.

In order to comprehend these processes of environmental change in developing countries, it is important to assess land use changes together with any factors underlying them. Despite the known effects of urbanisation, including acid rain, ozone depletion, and global warming, urbanisation has had a substantial impact on the availability of arable land, and resulted in deforestation in many parts of the world. This statement brings to mind the case of Wadi Hanifa valley that has encountered many years of depletion owing to human encroachment and pollution. Muneerah (2015) reveals that the valley has borne the brunt of sewerage flowing from the city, which has put at risk the many water aquifers that are found in this area. It is also believed that resource depletion risks are becoming higher in urban areas as a result of the increasing demand of quantities of water, food and fuel into cities, and the disposal of waste materials that are both logistically complex and highly resources-consuming. One of the commodities that have been adversely affected by the increased population growth has been water supply. According to GAMEP (2017), urbanisation has been characterised by increasing consumption of water by households and subsequently, increased demand. This has increased the risk of the depletion of water aquifers, which have been a major source of water supply to the city. Subsequently, DeNicola et al. (2015) project that water

scarcity will become Saudi Arabia's biggest challenge in the coming years unless members of the public are not enlightened on the need to conserve water.

2.13.1.2. Drivers of sustainable urbanisation

The economic boom in KSA has been mentioned as one of the reasons for the transformation of Riyadh from a small traditional village into one of the megacities in the Gulf region. Directly attributable to this oil boom is the fact that KSA is one of the largest producers of oil in the world. Bajaber (2017) notes that the rapid urbanisation in Riyadh was precipitated by the oil boom of the 1970s in the country, which brought a lot of revenue. These revenues were then injected into various infrastructural projects that eventually transformed the landscape of Riyadh into a megacity. Furthermore, the wave of infrastructural development precipitated an influx of internal and international migrants who were attracted to the perceived availability of employment opportunities in the city. In the case of KSA, its continued status as one of the top exporters of oil in the world translates into a steady flow of revenues that can be redirected towards sustainable urbanisation projects. Various studies have highlighted the potential impact of economic boom on the livelihood of residents. UNDP (2012) notes that economic dynamism can help improve the livelihood of city residents by providing them with more access to essential services in addition to enabling them access employment opportunities. In the case of Riyadh, the economic boom would provide resources to handle sustainable urbanisation-related issues, such as green housing, clean energy, increased water supply and availability of health facilities. Resolving these issues insofar as the needs of the city residents are concerned would improve their quality of life. Various studies further highlight the importance of the private sector in realising economic boom, which will drive sustainable urbanisation. Private sector involvement in various city projects brings with it innovative ideas that may create more employment opportunities and precipitate the economic advancement of the city as a whole (ADA 2010). In its National Transformation Plan (NTP) 2020, the Saudi government has indeed earmarked privatisation as one of its key pillars. In this regard, the government and the private sector would collaborate on various sustainability development projects (Al-Surf and Mostafa 2016).

An equally important driver of sustainable urbanisation in Riyadh is the political will among the actors tasked with enhancing sustainable urbanisation. This has been exhibited in the economic blueprints that have been developed by the Saudi government all of which highlight the importance of sustainable urbanisation. Al-Surf and Mostafa (2016) mention the NTP 2020 and Saudi Vision 2030 as two economic blueprints that underline the government's commitment to making sustainable urbanisation a reality. In the case of NTP 2020, one of the objectives outlined is to make use of the resources available to support future sustainability-based projects. As

aforementioned, one of the issues that Riyadh and other cities in KSA have been grappling with is the poor community involvement in urban planning and implementation. It is noteworthy that increased community involvement is one of the activities identified as crucial to achieving the objectives of the economic blueprints. For instance, as part of Saudi Vision 2030, the Crown Prince of KSA has developed an ambitious roadmap geared towards increasing the engagement between government officials and the local communities (Al-Surf and Mostafa 2016). The political will to realise sustainable urbanisation has further been evidenced by constant meetings among stakeholders of urban planning and related issues. One of these meetings is the Saudi Urban Forum, which is organised by the Future Saudi Cities Programme (FSCP) to seek ways of developing a strategic framework and new vision for realising a sustainable urban future in KSA. The FSCP brings together various stakeholders including government agencies, such as the Ministry for Municipal Affairs (MOMRA), international agencies, such as UN-HABITAT and local governments/AMANAHs (Future Saudi Cities Programme 2016). The programme is motivated by the need to attain several objectives. One of them is to review and develop appropriate structures and mechanisms of urban planning. It also seeks to build capacity of urban planners insofar as land management and spatial planning is concerned. Another key objective of SCFP is to enhance participatory governance of the 17 cities on which it focuses (Future Saudi Cities Programme 2016). As part of efforts to encourage community involvement, the programme additionally seeks to transform city residents into active development partners by enlightening them on the need to be involved in the development of their cities. It is noteworthy that FSCP is a by-product of Saudi Vision 2030 and its activities are aligned to the objectives of this economic blueprint. This political will exhibited by the government to the extent of engaging the expertise of international agencies will increase the chances of sustainable development in Riyadh and indeed, the whole of KSA.

2.13.2. Improving the quality of life

One of the products of sustainable urbanisation as highlighted by various reports is increased gender and income equality. Many Saudi youth have been afflicted by income inequalities that have morphed into a wealth inequality. Al-Khateeb (2015) warns that increased income inequality occasioned by lack of employment opportunities may push many youths into illegal activities out of frustration. On the other hand, Renaud (2016) points out the importance of an inclusive business environment in creating income equality by offering everyone an opportunity to better his or her livelihood. UNDP (2016) notes that the adoption of sustainability practices within cities can create an avalanche of job opportunities for the many residents. These practices range from the adoption of green building materials to the use of renewable energy systems to the adoption of waste recycling. The application of these sustainability practices require manpower, which will come

from the residents of the city (UNDP 2016). These employment opportunities will provide many young people in Riyadh who are currently jobless with a source of income to cope with the cost of living. Considering that it has been mentioned as a cornerstone of sustainable urbanisation, public-private sector collaboration also increases the likelihood of increasing the number of employment opportunities available for the youth in Riyadh. UNHABITAT (2017) notes that the involvement of the private sector in hitherto public infrastructural projects would increase the number of employment opportunities in the private sector, which historically has not been a prominent employer of many Saudi youths. In contrast, before the advent of the *Saudization* policy, the bulk of employment opportunities were available in the public sector; opportunities that were not enough to cater to all the job needs of the Saudi youth (Peck 2017).

Gender equality (or inequality) is an issue that has been synonymous with the Saudi culture for many years. Consequently, various studies highlight the relationship between gender equality and adoption of sustainability practices. UNHABITAT (n.d.) notes that women – considering that they are naturally tasked with maintenance of their households – would be helpful in the adoption of sustainable practices at the household levels. These sustainable practices include modern waste disposal, participatory governance and renewable energy, among others (UNHABITAT n.d.). According to Renaud (2016), women in the rural areas have taken charge of their households following the migration of their husbands to the urban areas. In such instances, it follows that women will be an important stakeholder to target if the adoption of sustainable practices is to occur at an exponential rate – at least at the household level. It is important that any form of public awareness on sustainability should target them to ensure that they get to play this crucial role. That women have a special role to play in the sustainable development of KSA is evidenced by their inclusion in a chapter of the Ninth Development Plan. The chapter details the strategies to enhance and increase female participation of women in various aspects of the society (MOMRA 2013). The achievement of these strategies would result in enhancing gender equality and enable women exploit their potential insofar as sustainable urbanisation is concerned.

Another impact of sustainable urbanisation insofar as improving the quality of life is concerned is a cleaner environment resulting from better environmental management. Several studies have highlighted the impact of better environmental management practices – such as natural resource preservation, waste-to-recycling, water conservation and renewable energy – on the standards of living. Anjum et al. (2016), for example, earmarks anaerobic digestion method as a modern waste disposal method that can provide alternative sources of fuel in the form of liquid fuels. These fuels can further reduce dependence on non-renewable energy methods, such as fossil fuels, which have been majorly responsible for the reduced air quality in many cities worldwide – particularly in

Riyadh. Furthermore, the municipal authorities in Riyadh should consider adopting pyrolysis technologies that can convert non-biodegradable waste, such as plastics into various value-added products, including char, fuel and gases (Anjum et al. 2016). The authors' proposals are timely considering that Riyadh is facing a big challenge with regards to the increasing amount of solid municipal waste, which has been evidenced by the congestion of various landfills in which this waste is dumped. Adoption of sustainable practices related to waste management will certainly help the city overcome the challenge presented by the congestion of landfills, which is the emission of harmful methane gas (Anjum et al. 2016). GAMEP (2017) highlights the importance of planting more trees and increasing the proportion of green areas in relation to pollution. The adoption of these sustainable practices will contribute to green, sustainable and smart cities by absorbing pollutants, reducing the effect of dust storms, serving as carbon dioxide basins and enabling the use of treated wastewater. These practices will culminate in healthy and safe environments for city residents (GAMEP 2017). One of the major sources of fossil fuels in Riyadh is the numerous private cars on the roads, which are further responsible for constant traffic congestion. The presence of many cars is attributed to the affordability of these cars and the fact that KSA is a top producer of oil and thus never experience shortages of this commodity. Riyadh is a testament of the economic growth that has occurred in KSA considering the former's transformation from a sleepy town to a megacity. However, Alshehry (2015) warns that economic growth should be balanced with the need to conserve the environment. This statement closely resonates with UNDP (2016), which notes that many cities forego the need to conserve their environments at the expense of economic growth with the belief that the resources generated from the economic growth can then be channelled towards conserving the environment. Nonetheless, Alshehry (2015) notes that any increase in per capita GDP is often accompanied by an increase in carbon emissions. In Riyadh, the traffic congestion is a major contribution of air pollution occasioned by the emission of fossil fuels into the atmosphere by cars, which then increase the carbon emissions. Whereas the number of vehicular trips has increased every year, the adoption of walkability has been dropping. According to Ledraa (2015), urban planners have not helped in the adoption of walkability by concentrating more on building road networks instead of more walkways. Furthermore, city residents have shunned the pedestrian-friendly environment in favour of private cars as their chief mode of transport.

The adoption of sustainable practices in urban planning and development will also precipitate the increase in affordable housing. Various studies have focused on the housing shortage in Riyadh as the city continues to urbanise rapidly. Susilawati et al. (2017) point out the direct link between the rapid urbanisation and the increase in informal settlements not only in Riyadh but also in other

major cities. In an earlier study, Susilawati and Al-Surf (2011) attribute the shortage of houses to the rapid population growth that incapacitated the municipal authorities' ability to provide adequate housing for all residents. Subsequently, the uptake of green buildings has been mooted as a solution to this challenge by providing quality housing to many residents at affordable prices. Al-Surf et al. (2014) extol the formation of the Saudi Green Building Council as the right step towards incorporating green building materials in the construction sector. One of the reasons cited for the high cost of most houses in Riyadh is the expensive costs related to building materials; these costs are then passed on to the consumers by the developers. The use of green building materials will not only result in affordable housing but also reduce the costs associated with various utilities, such as electricity, water consumption and air ventilators. Indeed, HOK (2013) uses the example of homes in Nevada to show that the use of sustainable building materials is cost effective. Whereas it would cost $1,500 to fit a Nevada home with energy efficient methods as per the model energy code in the state, this would culminate in annual savings of $400 insofar as energy bills are concerned (HOK 2013). In Riyadh, the most people affected by the unaffordability of houses in Riyadh are the rural migrants who come to the city in a bid to improve their livelihoods. In its survey on the demand for and supply of residential and commercial housing in Saudi Arabia, JLL (2017) points out that there has been an upsurge in the number of villas that have been constructed in the city. Nonetheless, most of these villas are targeted at the international migrants because they are out of the price range of many rural migrants who are simply trying to earn a living.

Sustainable urbanisation is also an integral ingredient in creating spatial equality. Social exclusion has been the subject of various studies insofar as various cities are concerned. Renaud (2016) notes that many developing cities are characterised by increasing spatial inequalities between and within cities. Spatial inequalities have been manifested in the way that certain areas of the cities are ghettos that are afflicted by many problems, such as crime, poverty, limited basic services and unemployment. On the other hand, spatial equality means that the socioeconomic gaps between residents are reduced such that all of them have equal access to health, employment opportunities and education, among others. In Riyadh, one of the issues that have afflicted many residents insofar as spatial inequality is concerned is the access to healthcare. Mansour (2016) points out that many health facilities are concentrated in the districts situated in the central parts of Riyadh Governorate whereas other districts located outside the governorate do not have enough health facilities. Subsequently, this has affected residents in the latter part of the city who cannot get enough access to healthcare services compared to their counterparts in the central part of the Governorate. It is noteworthy that the Saudi government has attempted to reduce inequalities through social safety nets targeting various disadvantaged social groups. Alsayyad and Nawar (2017) cite the Unified

Citizens Account and the *Hafiz* scheme as examples of social safety nets programmes that are integral to reducing inequalities as enshrined in Saudi Vision 2030. Approximately 11 million migrants have benefited from the Hafiz scheme by enabling them to meet their essential needs while they are in their new environment (Alsayyad and Nawar 2017).

2.13.3. Social, Environmental and Historical Factors Affecting Sustainable Urbanisation

2.13.3.1. Social factors affecting sustainable urbanisation

Various studies have mentioned community involvement as an important social factor that will determine the success of sustainable urbanisation. These studies have further pinpointed the urbanisation-related challenges to the lack of community involvement. For instance, Future Saudi Cities Programme (2016) decries the lack of community involvement in the policy making processes that are often confined to government officials. This has resulted in the formulation of policies that do not conform to the prevailing situation on the ground as far as urbanisation-related issues are concerned, including population growth, demand for essential services and housing, among others. In another study, Al-Surf et al. (2014) decries the fact that the uptake of sustainable building materials has been hampered by lack of public awareness on the importance of these building materials in alleviating the shortage of housing. This has been the same case with the uptake of renewable energy technologies. GAMEP (2017) acknowledges that the successful adoption of renewable energy sources is dependent on the level of community involvement, which is further dependent on the level of awareness of the public. Furthermore, the increased water consumption and demand that has afflicted Riyadh is attributable to the fact that the public is not knowledgeable on the extent of water scarcity that will worsen as the population continues to increase. Similarly, Alghamdi's (2018) study reveals that many public university students have a low awareness of sustainable development. This could portend a lot of challenges for the kingdom insofar as community involvement in achieving the objectives of the various economic blueprints, such as NTP 2020 and Saudi Vision 2030 are concerned. UNDP (2016) notes that the participation of members of the public in various urban planning processes helps prevent the collusion and capture of power by the elite. Participatory governance ensures that the resultant policies and legislations are based on the needs and demands of the city residents as well as of all the other stakeholders.

Another social factor that could be influential in sustainable urbanisation is the changing lifestyles of Saudis especially the youth. In their study, Susilawati and Al-Surf (2011) note that many youths tend to move out of their families' home when they come of age and subsequently, start living in their own homes. This phenomenon could thereafter be linked to the increased demand for housing. Furthermore, unlike the past, the oil boom has occasioned an increased dependence on

cars as the mode of transport. On the other hand, the hot weather has discouraged many Riyadh residents from adopting the walkability culture. It is interesting that most of the walkways are situated in the old neighbourhoods whereas the rapid urbanisation has inspired the government to focus its attention to expanding the road networks (Ledraa 2015). That Riyadh residents – and by extension, KSA – have changed to a lifestyle of using cars as the mode of transportation has been evidenced by the increasing number of vehicular trips. ADA (2015) estimates that vehicular trips in Riyadh will increase to 12 million per day in the next 15 years from the 7.4 million trips that the city was experiencing in 2015. This could be an impediment to sustainable urbanisation efforts as carbon emissions will increase and subsequently worsen the air quality; this is unless Riyadh residents are encouraged to adopt sustainable means of transport, such as the mass transit public transport system. On the other hand, the increasing adoption of the social media as a platform of communication could help raise awareness on the need to adopt sustainable urban practices. Zowawi et al. (2015) notes that the social media is one of the most effective tools in the Gulf countries to use to reach out to the masses. In another study, Kiefer (2015) states that KSA has a majority of active users of social media in the Middle East where 40% of Twitter users are Saudi youths. Indeed, these studies point out that social media can be helpful in reaching out to Saudi youth on the importance of sustainable urbanisation and subsequently, obtain their buy-in into various sustainable urbanisation processes or projects.

Various studies have mentioned the rapid population growth in Riyadh as a driver of urbanisation of the city. Consequently, these studies have noted that any discussions on sustainable urban planning and implementation must factor in the rapid population growth rate of the Saudi cities. Al-Surf et al. (2017) points out that the high population of Riyadh is an important factor to consider because of its ripple effects on other urbanisation-related issues, particularly housing. In an earlier study, Al-Surf et al. (2013) reveal that Saudi Arabia has been the most affected by the housing shortage occasioned by its rapid urbanisation compared to its Gulf counterparts, such as Oman, UAE and Bahrain. From an environmental aspect, the effect of population growth rate has been manifested in the form of increased pollution, natural resource depletion, increased municipal waste and encroachment on Wadi Hanifa valley. GAMEP (2017) acknowledges that rapid population growth rate has been responsible for the increased demand and subsequent consumption of water. Consequently, there is the danger that water aquifers from where the city gets its water supplies may be depleted. In their study, Ouda et al. (2017) note that the increasing water consumption will continue so long as the population of Riyadh and KSA in general continues to grow. Choguill (2008) reveals that the daily water consumption per person in 1980-1999 had risen from 120-315 litres. Fast forward to more than a decade later and the water demand-supply

deficit has increased to 11.5 billion m^3 (Ouda et al. 2017). Bearing the effects of increased population on urban centres thus far, the work is cut out for urban planners who will have to contend with the task of reversing the negative effects of increased population as well as to tackle new challenges resulting from the same. As the population of Riyadh bulges, so has the challenge of waste management which increased two-fold. This has even posed a danger to water catchment areas that for many years have been a key source of water for the residents. Muneerah (2015) mentions Wadi Hanifa valley as an example of a water catchment area that has suffered due to the urban sprawl in Riyadh. Before government efforts to reclaim it, there was a lot of waste that was dumped in the valley, which posed a threat to the survival of the many water aquifers contained within. The dumping of waste in the valley increased the risk of water pollution through the seepage of this waste into the water aquifers.

However, high population growth rate may not always have negative ramifications for sustainable urbanisation. Several reports have highlighted the positive impacts of high population on sustainable urbanisation especially with regards to migration. For instance, UNDP (2016) notes that migrants bring with them innovative approaches from their origins, which could be shared with their host communities for the prosperity of the city. However, in most cases, the tendency has been to perceive migrants as a nuisance and people who have come to take over the jobs held by the host communities. In contrast, UNDP (2016) notes that cities can glean the best from migrants in terms of fostering an entrepreneurial culture, economic dynamism, cultural diversity and economic growth. These benefits would often outweigh the short term costs incurred in activities aimed at social inclusion, including integration of migrants into the city's social fabric. UNDP (2016) mentions New York, Sydney, Hong Kong and Berlin as examples of cities that have benefited from the influx of migrants. The impact of migrants has already been witnessed in Riyadh insofar as international migrants. Garba (2004) notes that two foreign companies were instrumental in the formulation of the urbanisation plan for Riyadh in the aftermath of its oil boom and rapid urbanisation. They include Greek company Doxiadis Associates and Indian-based Sarvajanik College of Engineering and Technology. It follows then that urban planners in Riyadh and other KSA cities will need to borrow ideas from foreign experts if sustainable urbanisation is to succeed.

2.13.3.2. Environmental factors affecting sustainable urbanisation

Land use has been mentioned by various studies as a key urbanisation issue in Riyadh insofar as environmental factors are concerned. ADA (2010) notes that the increasing demand for housing and commercial properties has affected the city's vegetative cover as people engage in increased grazing and unrestricted recreational activities. This environmental problem is not only exclusive

to Riyadh but to other urban centres as well. Urban sprawl has been characterised by the clearing of forest areas to create more space for erecting residential and commercial properties. This pattern of land use would negate the goals of sustainable urbanisation by accelerating natural resource depletion in favour of unsustainable investments. In Riyadh, Wadi Hanifa is an example of a natural resource that has been affected by improper land use. The expansion of Riyadh's urban boundaries was manifested when people started encroaching on the valley to build residential buildings (Abdallah 2017). What is more baffling is the amount of land areas in Riyadh that are underused and underutilised as revealed by a 2017 World Bank study. Bidgood et al. (2017) reveal that the government and land speculators have a lot of land in their possession, which can be redistributed to accommodate the increasing demand for housing. However, these efforts are hamstrung by land policies related to management of government land, land regulation, capital investment planning and location.

Several studies have also identified the climatic conditions in Riyadh as an important environmental factor insofar as urbanisation is concerned. These studies focus on how climatic conditions have affected various aspects of urbanisation. GAMEP (2017), for instance, KSA has been affected by global warming characterised by a rise in temperatures and reduction in rainfall, which has consequently hindered proper land use in the kingdom. It follows that urban planners will have to consider the feasibility of various sustainable practices in relation to the climatic conditions of the city. One resource that has been adversely affected by the climatic conditions in Riyadh and the whole of KSA is water. DeNicola et al. (2015) point out that a huge proportion of water resources have been dedicated towards irrigation of farmlands of wheat because farmers cannot solely rely on natural rainfall to water their crops. The problem has been compounded by the use of traditional irrigation methods, such as flood irrigation, that are counterproductive and instead result in wastage of water. Likewise, GAMEP (2017) notes that irrigation of agricultural lands is responsible for the increased risk of water scarcity. In light of these reports, water conservation – as an aspect of sustainable urban planning and implementation – may face challenges occasioned by the climatic conditions of the kingdom. Conversely, the climatic conditions of Riyadh may bode well for sustainable urbanisation insofar as water conservation is concerned. GAMEP (2017) notes that the country frequently experiences flooding especially during the rainy season. Considering that this is the case, the adoption of rainwater harvesting may be a sustainable practice that could help alleviate the increasing demand for water.

Waste management has been an issue that has been synonymous with discussions on urbanisation. Various studies have decried the poor waste management methods employed by urban planning officials. GAMEP (2017) admits that many municipalities lack sound and sustainable waste

management methods that are able to cater to increasing production of municipal solid waste. Anjum et al. (2016) reveals that Riyadh is the leading producer of municipal solid waste at over 2,800 tonnes of waste per annum. This waste consists of organic waste as well as non-biodegradable waste, such as plastics. Of the two, non-biodegradable waste has proved problematic because of the environmental risks it poses. GAMEP (2017) notes that many municipalities are grappling with how to manage the disposal of non-biodegradable, such as electronic waste, which are increasingly growing in proportions. In light of this environmental challenge, sustainable urban planning would have to consider how to dispose of such waste carefully without harming the environment or residents. UNDP (2016) proposes waste-to-recycling, reuse and ecosystem-based sewage treatment as cornerstones of any sustainable urban planning and development. The report adds that developing cities should not ignore the long-term costs involved in cleaning up the environment and remediation in the aftermath of rapid modernisation. From this perspective, the poor waste management methods in the major cities of KSA would be a setback to sustainable development as urban planners would have to spend extra resources towards cleaning the environment.

Equally focused in various studies and reports is the rate of pollution and its effect on sustainable urbanisation. Pollution is a problem that not only afflicts Riyadh but also other cities in developing countries. UNDP (2016) notes that economic growth for many cities come at the expense of increased pollution – especially air pollution – and natural resource depletion. However, the reduced air quality poses various health problems to the city residents, including respiratory complications, stomach discomfort and nausea, among others. In other instances, increased pollution poses problems for food security. Alyemeni and Almohisen's (2014) study reveals that increased carbon emissions from industries and vehicles result in deposit of heavy metals in leguminous crops located in areas experiencing reduced air quality.

In Riyadh, the upsurge in car ownership has culminated in increased carbon emission through fossil fuels (Alkhathlan and Javid 2015). Apart from the increased the number of cars on the roads, some of them are dilapidated and emit a lot of fossil fuels into the atmosphere. Another form of pollution that has increased in Riyadh and KSA is wastewater pollution. DeNicola et al. (2015) note that the use of poor waste management methods has sometimes resulted in the discharge of untreated effluent into the environment. Some of this wastewater may end up in groundwater resources, which makes the water drawn from these resources unfit for human consumption. The continual rate of pollution as far as water resources and the atmosphere are concerned may become a huge barrier for sustainable urban planning and development.

2.13.3.3. Historical factors affecting sustainable urbanisation

Various studies have pointed out the phasing out of Islamic architectural designs in favour of Western architectural designs. For example, Al-Surf et al. (2013) point out that the rapid urbanisation rate has swept away Islamic architectural designs as more construction companies design their properties in favour of Western designs. Similarly, Choguill (2008) points out that there are only a few mud dwellings that are left in Saudi Arabia out of the many that used to dot its landscape before the oil boom of the 1970s. Consequently, the adoption of Western architectural designs have affected the lifestyles of many Saudi families in Riyadh. One of the most affected aspects of this change in architectural designs is the privacy of most families. Susilawati and Al-Surf (2011) note that privacy used to be one of the key considerations during the construction of residential buildings. As a result, many traditional Saudi neighbourhoods contain high walls, gardens and a stream of houses consisting of shared walls. However, the shift to a Western architectural design has denied many households the privacy that has always been a key consideration of many Saudi families when constructing residential properties. The assumption is that sustainable housing should not only incorporate the Western perspective of sustainable practices but also consider the Islamic architectural designs. Al-Surf et al. (2014) point out that one of the challenges that might hinder the adoption of green building materials is how to incorporate Islamic architectural designs.

Another historical issue that has featured in discussions on sustainable urbanisation is the past urbanisation processes in Riyadh. Several studies have sought to examine how the past urbanisation processes may impact sustainable urban planning and development. For example, Bajaber (2017) notes that the urbanisation in Riyadh was spontaneous and was not guided by any master plan. Indeed, the first master plan by Doxiadis Associates was in the aftermath of the oil boom when urbanisation rate had already accelerated. As such, it was unable to reverse the effects of haphazard urbanisation because it was not reflective of the reality on the ground. It follows then that sustainable urban planning and development must seek to reverse the side effects of the rapid urbanisation rate, including air pollution, poor waste disposal, natural resource depletion, water scarcity and shortage of housing, among others.

2.13.4. Challenges of Planning for Sustainable Urbanisation

Several studies have decried the outdated urbanisation policies and legislation as big impediment to sustainable urban planning and development. These policies have consequently affected various aspects of urban planning, including coordination among urban planners, community involvement and clarity over the roles of different urban planners. For example, UNHABITAT's (2016) study reveals the frustrations of AMANAH officials who note that the current policies and legislations

are ineffective for guiding them in urban planning and development considering that the composition and population of the municipalities have greatly transformed. Similarly, Future Saudi Cities Programme (2016) notes that there is poor coordination among urban planning officials at different levels of governance because the policies do not clarify the different roles of the various urban planners. Furthermore, Garba (2004) notes that policy making in Riyadh and KSA in general was doomed from the start because they did not involve the input of local government officials. Instead, these policies were formulated at the higher levels of government and then passed down to the local government officials who were expected to implement them. Consequently, these local government officials were left hamstrung because they could not evolve their innovative approaches to solve the urbanisation-related complications at the grassroots. This situation was further compounded by the fact that these policies and legislation are not informed by empirical evidence on the needs and challenges faced by members of the public at the grassroots. Bidgood et al. (2017) identify land use policies as one area in which the government needs to improve in order to enable sustainable urbanisation. These policies have precipitated a situation in which the city is expanding outwards and at low density. Consequently, Bidgood et al. (2017) point out that this sprawling development has resulted in a lack of fiscal, social and economic sustainability of the city. This has necessitated the formulation of policies that encourage distribution of government land majority of which is unused in addition to encouraging land speculators to sell of their land parcels rather than holding on to them. Considering the urban planning challenges that have arisen as a result of ineffectual policies, it follows then that sustainable urban planning and development will remain a mirage unless these policies are updated.

Several studies also highlight the impact of rapid population growth on urban planning and development. The growth in population has increased the demand for resources and consequently impacted public service delivery. For instance, Al-Surf et al. (2013) note that the rapid population growth has been followed by a shortage of residential properties to cater to the huge demand. Even in cases where the residents are able to access housing, most of the houses are unaffordable as is the case of villas, which are mostly targeted at expatriates. Indeed, Knight Frank (2014) projects that the prices of houses will skyrocket as their demand continues to increase. An equally affected resource by the increased population is water whose consumption has increased. Considering that KSA is an arid country, water scarcity has been a perennial problem not only in Riyadh but in the whole kingdom. Dube (2017) notes that population increase has resulted in rapid depletion of groundwater sources, which have historically been misused for agricultural irrigation. Similarly, GAMEP (2017) notes that water consumption has increased even at the household levels owing to

population growth. It further warns that the water scarcity problem will exacerbate as the groundwater resources are not replenishing at a rapid rate than they are being depleted. The rise in population has also resulted in a heightened risk of groundwater pollution owing to increased solid municipal waste. This situation has been compounded by the poor sewerage treatment by the municipality. As aforementioned, this has culminated in an increased risk of untreated wastewater seeping into the groundwater resources. Considering the direct relation between rapid population growth and increased depletion of resources, sustainable urbanisation efforts would be complicated because of increased demand for resources. Another effect of the increased population growth insofar as sustainable urbanisation is concerned is incessant traffic congestion. Several studies point out the fact that this congestion has turned urbanisation into an expensive issue in terms of road accidents and time wasted on the roads. Ramisetty-Mikler and Almakadma (2016) estimate that the city was losing $3.6 billion per annum as a result of road carnage. Similarly, Alotaibi (2017) blames the increasing road accidents on the increasing traffic gridlock in Riyadh. As the kingdom continues to experience economic growth owing to the oil boom, more people are able to afford private cars that further contribute to traffic congestion – and by extension, to road accidents.

Another challenge in urban planning, which has been identified by several studies is the high cost of living. The high cost of living has subsequently prompted many people to adopt unsustainable methods, which may seem affordable in the short run but costly in the long term. UNDP (2012) reveals that many people may be compelled into using unsustainable energy resources, such as fossil fuels due to the high cost of living. This is not only a dilemma that is exclusive to Riyadh but also to many other cities in developing countries where many people may find it difficult to afford high connection fees and tariffs insofar as electricity is concerned. Thus, such people are inclined to replace the use of electricity with unsustainable alternatives, such as kerosene or solid fuels for heating and cooking (UNDP 2012). In KSA, one of the projected barriers to the adoption of green building materials is their unaffordability. Al-Surf et al. (2014) notes that the extra costs involved in the importation of green building materials prevents many construction companies from adopting green building in their construction projects. Furthermore, the government has not provided incentives or tax reliefs to encourage these developers to invest in green buildings. Considering that the extra costs would most likely be passed on to the final consumer, the assumption is that the developers may choose to ignore the inclusion of green building materials especially if their targeted consumers belong to the lower end of the market. Similarly, Susilawati and Al-Surf (2011) pinpoint high cost of living as a barrier to the adoption of sustainable building materials by construction companies. Such companies shy away from incorporating green building

technologies in their designs because many of their consumers may not be able to afford their houses. Other studies make note of the relationship between the high cost of living and unemployment. ADA (2010) for example, highlights the fact that the increasing unemployment rate will precipitate other challenges, such as the deterioration of living standards and inability to afford essential services. Closely related to the unemployment factor is the widening socioeconomic status in Riyadh and in KSA in general. Foran et al. (2014) notes that KSA is one of the most unequal countries in terms of wealth and supersedes the level of wealth inequality in developed countries, such as the United States (U.S.) and United Kingdom (UK). Considering that an inclusive policy formulation process is integral in sustainable urban planning and development, a city that is divided along socioeconomic lines may not be socially cohesive and thus unable to come together for the purposes of enhancing sustainable development. UNDP (2016) warns that socioeconomic inequalities may be tied to spatial inequality and may lead to intercity conflicts, upsurge in crime, drug addictions and other social ills. Indeed, Al-Khateeb (2015) warns that the spiralling unemployment among the youth may balloon into a political crisis spearheaded by frustrated youths.

2.13.5. Impact of Rapid Urbanisation on Desert and Arid Lands

Several studies have highlighted the prevalence of natural hazards not only in Riyadh but also in KSA as a result of urbanisation. The most prominent of these hazards is flooding, which is often prevalent in Riyadh during the rainy season in March-April. Muneerah (2015) reveals that the effects of the rainy season in Riyadh are usually felt as far as Wadi Hanifa valley, which experiences flash flooding of rainwater travelling at speeds of 60 km per hour. The encroachment of people beyond urban boundaries has culminated in the clearing of lands for settlement. GAMEP (2017) notes that there has been a rapid deforestation of lands, which has increased the risk of sandstorms and floods. Human encroachment on these lands has been followed by rapid depletion of natural resources and soil erosion, which increase the likelihood of the aforementioned natural hazards. This has been evident in the case of Wadi Hanifa where the encroachment of people on the valley resulted in a rapid depletion of groundwater sources as many people drew the water for agricultural purposes (Muneerah 2015).

Apart from increased flash flooding, the other form of natural hazard that has become common in Riyadh and KSA as a result of rapid urbanisation is drought. GAMEP (2017) notes that drought has become heightened in KSA considering the increased depletion of vital resources, such as water and the fact that the country itself experiences an arid and semi-arid climate. Ecologists hypothesise that the resilience of urban systems have declined as a result of the increase in population, thus making them more susceptible to disturbances, like severe droughts. Sources have

examined the hydrologic, climatic and biogeochemical aspects of urban systems, and have thus made a step towards the establishment of a broader ecosystem framework. From this point of view, research has stemmed with regard to sustainability. For example, the overuse of water has led to the depletion of aquifers, polluted groundwater with nitrates and salts, and accumulated surface soils with salts. Similarly, the urban climate has been recorded as being much warmer, which in already hot semi-arid and arid regions are, on balance, very unwanted for human well-being. However, it is unclear as to whether these findings imply that the urban ecosystem is unsustainable. Research indicates that when these detrimental changes are gradual, humans can often easily adapt. For instance, if soils become more saline during a span of say, ten years, salt-sensitive plants and landscapes get replaced with more tolerant species. However, this system has increasingly become less resilient to specific ecological disturbances and sudden catastrophic natural disasters. In desert regions, such as Riyadh, these disturbances would be more prolonged and cause severe drought. Drought in urban arid and semi-arid areas would therefore not only imply a decrease in water supply, but also be accompanied by significantly warmer temperatures. The salinity of water surfaces would also increase substantially, and the lead cities to seek and use larger amounts of groundwater to make up for the decreased supply at the surface (Haregewoin 2005).

As is the case with other cities in developing countries, rapid urbanisation has become synonymous with increased population. Consequently, various studies have highlighted the effect of increased population on increased pollution. Abdallah (2017) mentions Wadi Hanifa as one area of Riyadh that has witnessed increased pollution resulting from increased population in the municipality. The dumping of waste in the valley has increased the risk of groundwater pollution. Furthermore, poor waste disposal has altered the landscape of Wadi Hanifa thereby making life difficult for the many species in this habitat (Abdallah 2017). Apart from poor waste disposal, increased pollution in the case of Wadi Hanifa has been occasioned by accidental spills, leaks from pipes and storage tanks as well as pollution from agricultural waste. The challenges faced by Wadi Hanifa are evidence that the urban boundaries of the municipality are expanding ever since the oil boom of the 1970s. Indeed, GAMEP (2017) pinpoints the following factors as responsible for the increased pressure on environmental and natural resources: economic growth from the oil sector; population increase; agriculture; tourism; industrial activities; and pilgrimage events (Hajj and Umrah).

Several studies have also highlighted urban sprawl as a manifestation of the rapid urbanisation on desert and arid lands. Once again, these studies point out a direct link between the urban sprawl and the increased population growth. ADA (2010) note that rapid population growth will precipitate haphazard urbanisation that does not follow clear patterns of functional preferences. Likewise, Bidgood et al. (2017) reveal that the municipality has been unable to handle the

sprawling development that has extended beyond the original boundaries. Along with the rapid population growth rate, the increasing urban sprawl has been influenced by policies that allow for fragmented spatial development in Riyadh as well as low density. In addition, most of the lands in prime or central locations are in the hands of land speculators who are reluctant to develop these lands and instead prefer to sell them only when the land prices increase. Bidgood et al. (2017) also blame the government for the urban sprawl considering that it undertakes various projects at different locations without a feasibility study that looks at the infrastructure costs.

2.13.6. Integration of Sustainable Urbanisation in Future Development Projects

Discussions on sustainable urbanisation have regularly highlighted the importance of private sector involvement in sustainable development projects. Several scholars have mentioned the rationale of private sector involvement as their innovative approaches and financial muscles that can help the government shoulder the burden of urbanisation. Future Saudi Cities Programme (2016) points out that private sector involvement can help accelerate the process of sustainable development. Nonetheless, the successful involvement requires the formulation and enactment of flexible regulations that spur private sector involvement. In another report, UNHABITAT (2017) notes that the private sector can subsidise the budgetary deficits experienced by municipalities, which might prevent them from enacting projects that are hinged upon sustainable practices. Indeed, ADA (2010) notes that private sector come with extra finances to improve the urban development processes as well as innovative and sustainable approaches by virtue of the fact that they encourage innovativeness within their organisations. Another rationale for increased private sector involvement is the creation of additional employment opportunities. The fact that few Saudis are employed in the private sector has prompted the government to enact the Saudization policy that requires private companies to employ a certain proportion of Saudi citizens. Nonetheless, Kibsi et al. (2015) proposes that increased private sector investment, rather than the *Saudization* policy, would increase employment opportunities for the youth in the private sector. Encouraging private sector involvement would consequently create an additional 6 million job opportunities for Saudi youth by 2030. This is timely considering that the demographic bulge that KSA is presently experiencing will continue to increase by 2030. Kibsi et al. (2015) project that the number of jobless youth in the Saudi job market will increase to 10 million by 2030 whereas the number of those aged at least 15 years will increase by 6 million.

In another report, UNHABITAT (2017) extols private sector involvement by virtue of the fact that they enhance risk management of projects. It is not only in the municipality of Riyadh but also in other cities that urban planners and developers face challenges in handling the risks associated with urban projects. Conversely, private companies are often skilled in risk management and will

often undertake feasibility studies to identify such risks beforehand and come up with solutions. Their ability to handle risks enables them to minimise the chances of any complications related to the following issues: project design; integration of various subcontractors; sourcing of funds; operations; maintenance; and construction. In most instances, private sector involvement would occur through public-private sector partnerships (PPPs). Kibsi et al. (2015) note that PPPs allow for accountability by ensuring that projects are undertaken as per the budget, deliverables and timescale. Within the context of sustainable urbanisation, some of the projects that the private sector could be involved in include waste management, infrastructural development and housing. Turkey and Morocco are examples of countries where PPPs have enabled cities to provide residents with affordable housing (Al-Surf et al. 2014). In the case of PPPs, the government undertakes monitoring of the projects to ensure that the services are delivered as per the objectives.

The lack of public participation has been mentioned by several scholars as an influential factor in the urban sprawl in Riyadh. Future Saudi Cities Programme (2016) identifies the lack of an inclusive policy making process as an impediment to sustainable urbanisation. This barrier has been further compounded by the fact that urban planning structure is a centralised one where the decisions are conducted at the upper levels of the government. Lack of public awareness on urban planning further reduces community involvement in urban planning and development. Indeed, GAMEP (2017) laments the lack of public awareness on the importance of renewable energy as a reason for the low uptake of these forms of energy. Similarly, Al-Surf et al. (2014) suggest that increasing public awareness on the importance of green buildings will increase the uptake of sustainable building technologies. To this end, other studies have suggested the need for urban planners to enhance information sharing with members of the public. Abdulaal (2008) bemoans the fact that municipal councils have not been effective at sharing information with the residents insofar as delivery of public services is concerned. Likewise, Al-Barrak et al. (2016) admits that the government has not engaged efficiently with members of the public to create awareness on the public service projects in Riyadh and KSA. This has been exhibited on its e-government portal where the members of the public have been unable to share their feedback with the government regarding these projects. UNDP (2016) states that the lack of participatory governance prevents the community from holding the local government authorities accountable for their actions. Instead of a centralised form of governance, it advocates for participatory governance in which various stakeholders of urban planning and development are involved in the urban planning and processes. Similarly, Al-Surf and Mostafa (2016) extol the importance of participatory governance in the realisation of NTP 2020 and Saudi Vision 2030. The establishment of community councils has

been mooted as part of efforts to increase community involvement to realise the goals of vision 2030.

Far as sustainable urban planning is concerned the expertise of urban planning officials is an issue. Several researchers have highlighted the effect of low expertise on the success of urban planning and development. Future Saudi Cities Programme (2016) identifies the lack of expertise as a recipe for the urban sprawl in the major Saudi cities. The report further notes that many urban planners are not versed in the modern methods of urban planning or even the technologies used in the urban planning. In this regard, the lack of awareness on sustainable urbanisation is not only confined to members of the public but also to government officials. Future Saudi Cities Programme (2016) suggests capacity building programmes for urban planning officials in order to realise sustainable cities. This entails liaising with academic institutions to offer courses on modern or digital technologies for sustainable urban planning and development.

2.14. Conceptual framework

This study seeks to identify the issues (factors) facilitating or inhibiting sustainable urbanisation and development in desert cities using Riyadh as a case study. As indicated in Figure 2-2, the study espouses the idea that these factors can be social, physical, environmental, environmental or political in nature.

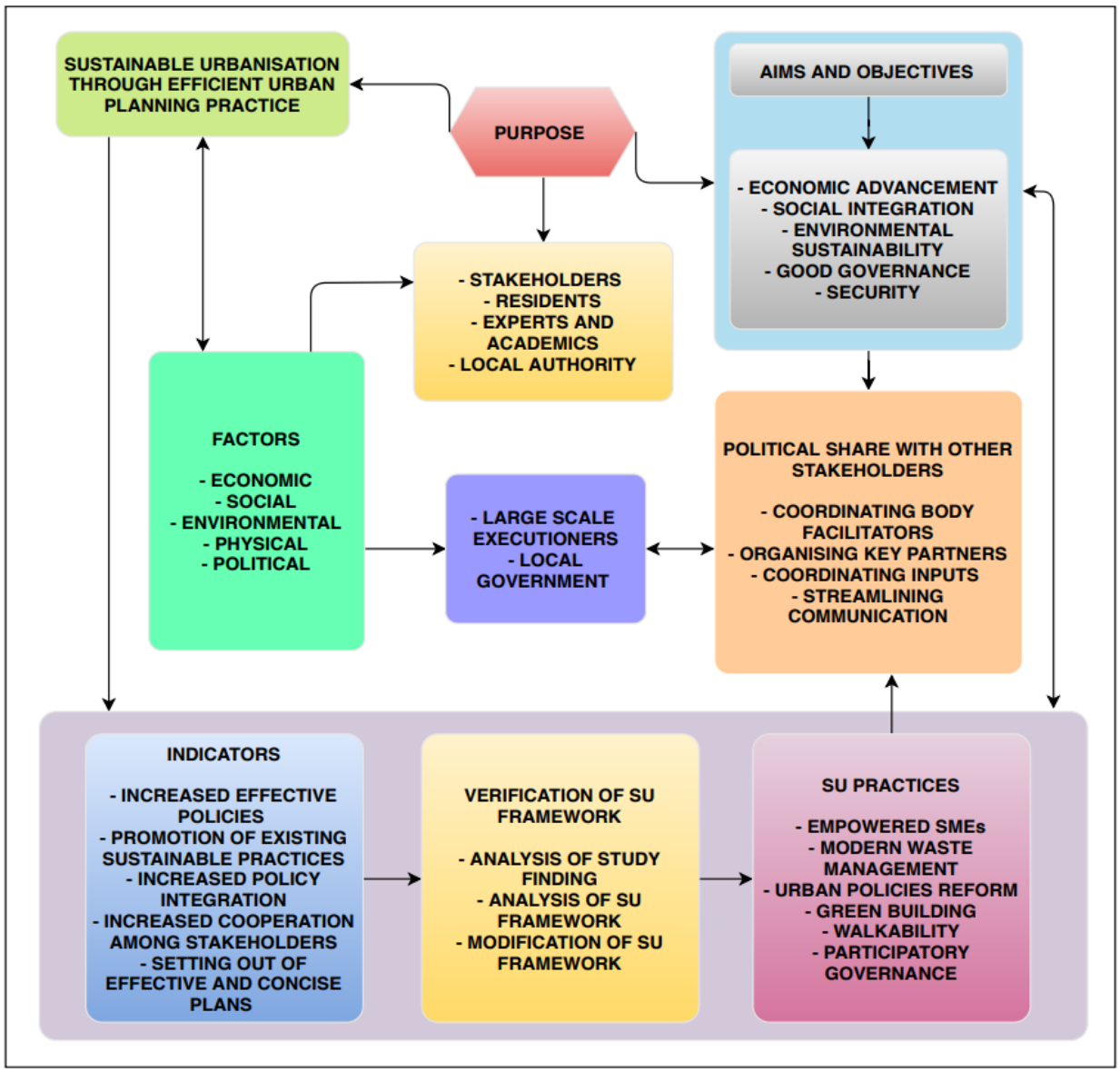


Figure 2-2: Conceptual Framework for development

Subsequently, the study digs out the various issues under each of the five factors that may impact sustainable urbanisation insofar as Riyadh is concerned. These issues would provide empirical evidence on the ingredients required to create a SU framework that can be integrated into the future development projects in the city. The researcher based the assumption on various theories of urbanisation, including the concentric zone theory, urban bias theory, modernization theory and Rostow's stages of economic growth/development.

2.15. Conclusion

The following are the emerging points from the literature review:

- The rapid population growth in Riyadh is responsible for a raft of challenges that the city has witnessed including increased pollution, housing shortage, strained infrastructure, poor waste disposal, increased water consumption and natural resource depletion;
- Poor policies and legislations have acted as catalysts in accelerating the urban sprawl in Riyadh. A case in point is the land use policies that have encouraged sprawling development by expanding the urban boundaries of the municipality;
- Community participation or participatory governance is an integral component to enhancing sustainable urbanisation and development. However, the level of community involvement is dependent on the level of public awareness on sustainable urbanisation;
- There is among the political actors to realise sustainable urbanisation. This is evident through the economic blueprints that acknowledge the need for sustainable urbanisation by encouraging private sector involvement, increased female participation and economic diversification;
- Just like other cities in developing countries, Riyadh has been affected by the influx of internal and international migrants. The trade-off for the oil boom that it has encountered is that it is increasingly perceived as a land of opportunities by many people who flock in search of the same;
- Nonetheless, the influx of migrants may be a positive sign for sustainable urban planning and development. Many migrants come with innovative approaches that may enhance economic dynamism in cities by sharing these innovative skills with their host communities;
- The Saudi government has made significant strides in sustainable urbanisation-related issues particularly in increasing female participation, enhancing private sector investment and economic diversification.
- The projected increase in the urban population of Riyadh means that the challenges associated with urbanisation will increase two-fold. These challenges include increased waste, increased unemployment, increased pollution, increased water scarcity and natural resource depletion;
- Research has still not yet been able to determine whether sustainable urbanisation will be able to create liveable communities. This factor, therefore, presents opportunities for future research;

- As much sustainable urban planning and development borrows from Western concepts, they must be cognisant of the Islamic culture in KSA. This is especially the case with the housing sector, which has slowly shifted away from the Islamic architectural design in favour of the Western designs. This has reduced privacy for many families, which has always been a key consideration for many Islamic families; and
- Urban planning officials do not yet have the skills knowledge and tools to undertake sustainable urban planning and development.

CHAPTER 3: CONTEXT OF THE STUDY

3.1. Introduction

Riyadh is the capital city of the Kingdom of Saudi Arabia (KSA) as indicated in Figure 3-1 and Figure 3-2, and one of the largest cities in the Gulf region as indicated in Figure 3-3. Its story is a transformation from a tribal village to a megacity that owes its growth to the oil boom that peaked in the 1970s. The oil boom brought about a lot of development especially in energy and transportation, and these sectors have continued to dominate the development of the metropolitan area in Riyadh. Between 1974 and 1980, vehicle registration increased by more than 10% and demand for electricity shot up by up to 50% (Choguil 2008). The purchasing power of the region rose significantly, land rates increased and more people began to move to the urban area in order to enjoy the convenience that city life has brought. As indicated in Figure 3-4, the transformation of Riyadh has been manifested through an expansion of its urban boundaries as more infrastructures are constructed.

Figure 3-1: Map of Saudi Arabia (Google Map, 2019)

Figure 3-2: Map of Saudi Arabia and division for each region (Source: Washington Institute for Near East Policy)

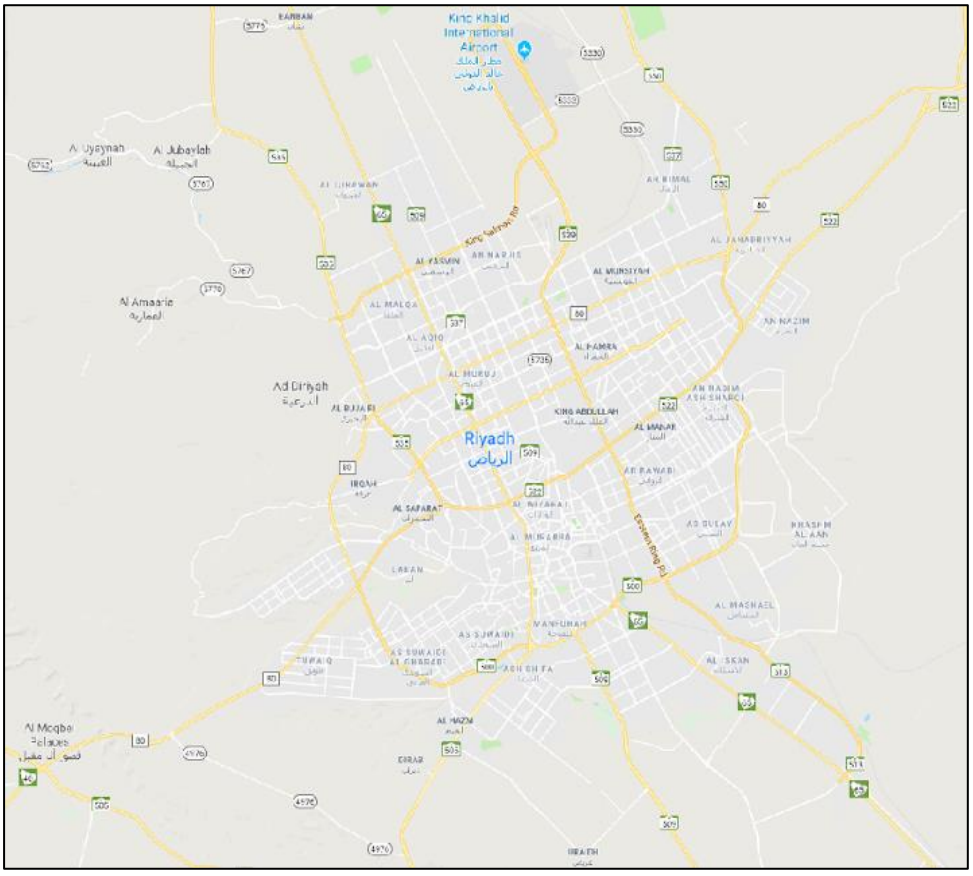


Figure 3-3: Map of Riyadh city (Google Map, 2019)

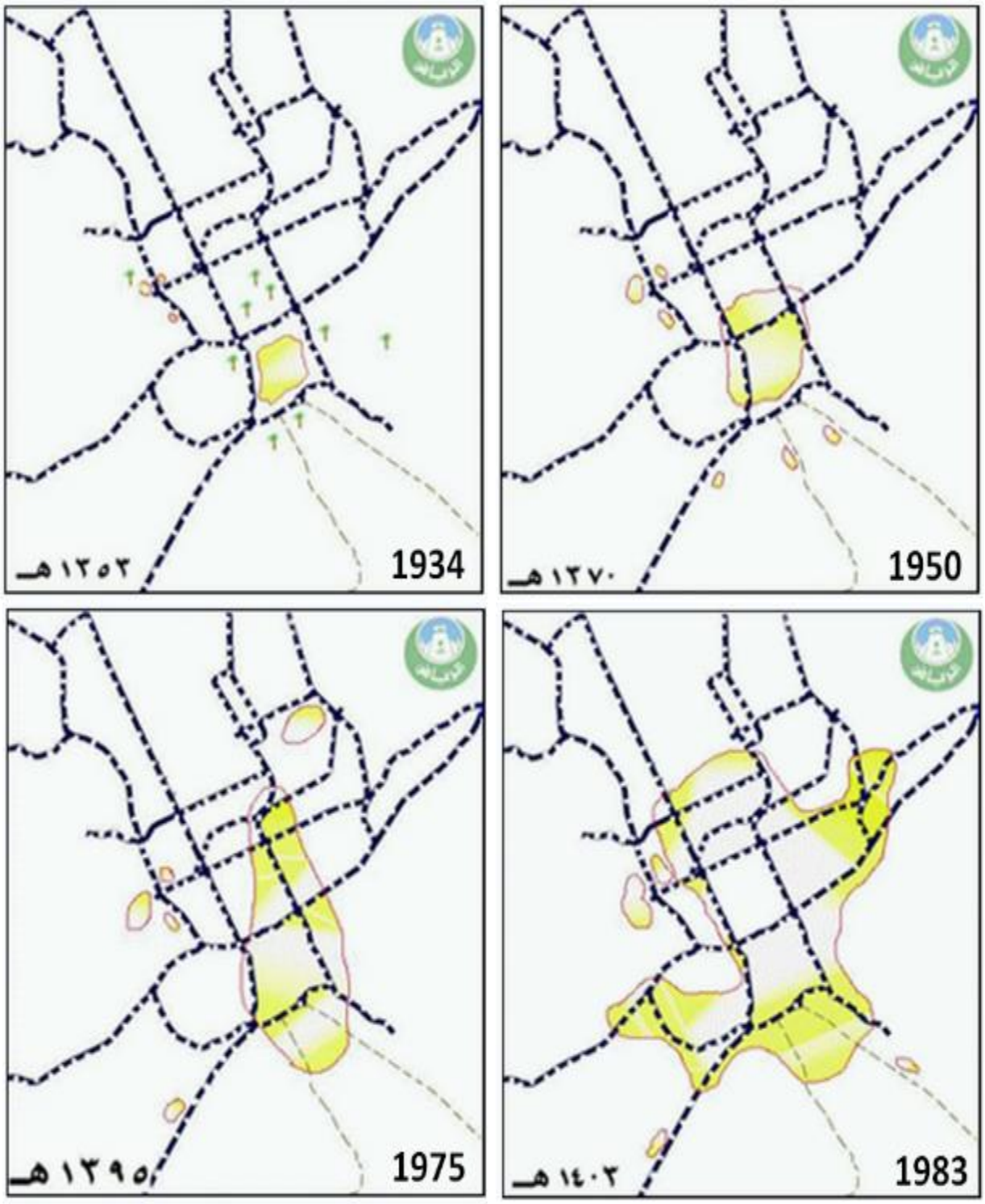


Figure 3-4: Riyadh's Expansion from 1934 to 1983 (Amanh, 2016)

Figure 3-5: Riyadh city map, in the year 2014 (ADA, 2015)

Just like the rest of the kingdom, Riyadh experiences a hot desert climate that is symptomized by high temperatures during the summer and warm temperatures in winter. Although the average amount of rainfall is little, the city experiences substantive rainfall between March and April, which sometimes result into heavy rainfall.

3.1.1. Population growth in Riyadh

As is the case with urbanisation in other cities in developing countries, urbanisation in Riyadh was characterised by a rapid increase in population. As per the latest statistics from the 2016 Demographic Survey, the total number of residents in Riyadh is approximately 8 million (General Authority for Statistics 2016). As indicated in Table 3-1, there is a large number of foreigners who have contributed to this huge population increase (approximately 3.4 million). This would lend credence to the fact that international migration is a key social factor responsible for the rapid urbanisation rate in Riyadh. This population increase is in stark contrast to the 14,000 people that were residing in the city in 1910 when it was still a tribal settlement.

Table 3-1: Population of KSA by administrative region, sex and nationality (2016)

Administrative Area	Total		الجملة	Non - Saudi		غير سعودي	Saudi		سعودي
	جملة	اناث	ذكور	جملة	اناث	ذكور	جملة	اناث	ذكور
	Total	Females	Males	Total	Females	Males	Total	Females	Males
Al-Riyadh	8002100	3267091	4735009	3422530	1062562	2359968	4579570	2204529	2375041
Makkah Al-Mokarramah	8325304	3593383	4731921	3884733	1405337	2479396	4440571	2188046	2252525
Al-Madinah Al-Monawarah	2080436	915813	1164623	727334	242038	485296	1353102	673775	679327
Al-Qaseem	1387996	588092	799904	396964	98891	298073	991032	489201	501831
Eastern Region	4780619	1913869	2866750	1692932	433660	1259272	3087687	1480209	1607478
Aseer	2164172	981020	1183152	444222	111668	332554	1719950	869352	850598
Tabouk	890922	390667	500255	180223	45050	135173	710699	345617	365082
Hail	684619	307066	377553	155507	39953	115654	529012	267113	261899
Northern Borders	359235	161685	197550	73749	19771	53978	285485	141914	143572
Jazan	1533680	703802	829878	346396	117167	229229	1187284	586635	600649
Najran	569332	253868	315464	138521	39916	98705	430711	213952	216759
Al-Baha	466384	217366	249018	90180	22294	67886	376204	195072	181132
Al-Jouf	497509	214622	282887	123847	30717	93130	373662	183905	189757
Total	**31742308**	**13508344**	**18233964**	**11677338**	**3669024**	**8008314**	**20064970**	**9839320**	**10225650**

Source: General Authority for Statistics Demographic Survey 2016

One of the reasons to which the population increase is attributed is the high birth and fertility rates resulting from improved healthcare services and generally, the standards of living. This factor allowed people to live longer whereas women were able to access effective pre-natal and postnatal care for their new-born, which reduced infant mortality rates. Indeed, in his study, Abusaaq (2015) projects that the elderly will constitute 52% of the total population in KSA owing to the improved standards of living in the kingdom.

Another factor for the increased population in Riyadh has been internal and international migration into the city. Internal migration involves the arrival of Saudis from other areas of the kingdom – predominantly rural areas – in search of livelihood opportunities, such as jobs, access to educational and health opportunities, among others. On the other hand, international migration involves the immigration of people from other countries to Riyadh for various purposes such as education, health and employment opportunities. According to the 2016 Demographic Survey, the number of non-Saudis in Riyadh was an estimated at 3.4 million majorities of whom were males (2.4 million) compared to females (1.1million). In another study, UNICEF (2013) notes that top countries of origin for migrants in the kingdom include India, Pakistan, Bangladesh and the Philippines. Another feature of the population growth in Riyadh has been the youth bulge. Statistics from the 2016 Demographic Survey reveal that a majority of Riyadh residents are aged between 18-39 years of age (General Authority for Statistics 2016). Furthermore, there are approximately 4.7 million male residents compared to 3.3 million in the municipality. Apart from health services, one of the socioeconomic aspects in which Riyadh has made great strides is access to education. As per the population and housing census of 2010, 92% of the residents had access to some form of education compared to 8% who were illiterate (Salam 2013). These statistics are in lieu of the efforts that the government has made in providing educational infrastructures in the municipality, including higher institutions of learning. Access to education – not only in Riyadh but the whole of KSA – has been further enhanced by improving female enrolment rates. This has allowed many young Saudi women to access educational opportunities and improve their chances of accessing the job market.

3.1.2. History of urbanisation in Riyadh

The history of urbanisation in Riyadh is traceable back to 1900 when the then King Abdulaziz established it as the capital city of the newly-founded country of Saudi Arabia. As can be seen in Figure 3-6, the transformation of Riyadh from a tribal village to a megacity by the 2000s involved an exponential expansion of its boundaries. As a small tribal village, its population was an estimated 14,000 in 1910, which had increased to 27,000 by 1930 (Bajaber 2017). The major economic activity in the city – which had a mere spatial coverage of 1 square kilometre – was nomadic livestock keeping and small-scale agriculture.

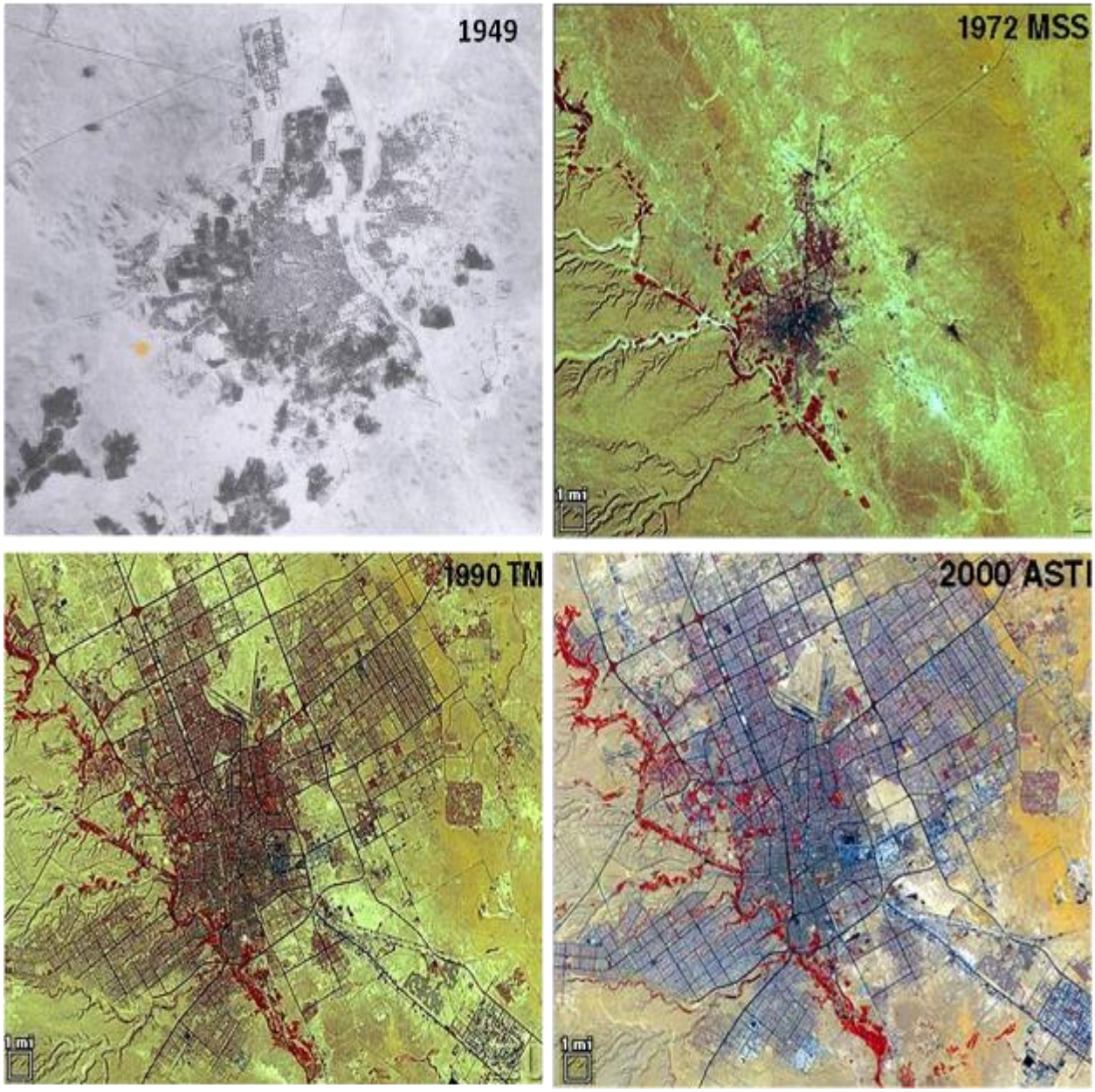


Figure 3-6: Riyadh in the 1949s, top left, in the 1972s, top right, and in the bottom two images, in the year 1990 and 2000 (Satingmagcorp, 2016)

The first steps of transforming the face of Riyadh into a major city was the construction of a wall around it as well as initiation of a programme of settling Bedouins in settlements called *Hijar*. Bajaber (2017) notes that this programme was influential in spurring migration out of which migrants were to later play a pivotal role in the rapid urbanisation of Riyadh. As the establishment of Saudi Arabia was attained in 1932 with the unification of the Hijaz region, Riyadh had started to experience exponential growth aided by the relocation of many national government activities to the city from Jeddah as well as Mecca. This period was characterised by the construction of buildings to house the new government agencies that had been transferred to Riyadh.

King Saud – the then king of Saudi Arabia from 1953-1964 – continued a trend that had been established by King Abdulaziz of constructing modern buildings outside of the old city walls. In his case, King Saud ordered for the construction of government-owned houses known as Al-Malaz, which were located 4 kilometres in the northeast area of the city. The Al-Malaz consisted of 750 villas, support facilities as well as 180 apartment units. Al-Hathloul (2017) notes that the Al-Malaz project set the precedence for the use of grid pattern of urban planning that was subsequently adopted by various real estate companies when constructing residential properties. This was a departure from the labyrinth pattern of urban planning and construction that had been used beforehand in Riyadh and other major cities, such as Mecca. The villa model of residences – that was one of the hallmark features of the Al-Malaz project – was subsequently emulated by other Riyadh residents when constructing their own properties. Al-Hathloul (2017) attributes this to the fact that Al-Malaz was a government project and thus, the construction of villas was considered by Riyadh residents and realtors as the preferred/official model for residences in the city. During that period, government employees were mostly considered to be of high social standing by the rest of Riyadh residents and so many considered the villas constructed for them as part of the Al-Malaz project as prestigious and something worth emulating. Examples of neighbourhoods that were the first to incorporate the architectural design of Al-Malaz include al-Wazir, al-Khazzan and al-Thumairi. Other features of the Al-Malaz project that were adopted in subsequent master plans for Riyadh included square lots upon which villas were built, setbacks on the sides of the square lots and hierarchical patterns of streets. These features were incorporated in the 1972 Riyadh Master plan developed by Doxiadis Associates (Al-Hathloul 2017). Another consequence of King Saud's projects was the affirmation of road network – and more specifically private cars – as the main mode of transportation in the city.

Riyadh's population grew significantly as its urbanisation rate increased from 5% in 1930-1950 to 8% in 1950-1970. Estimated population was 46,000 (1940), 160,000 (1960) and 350,000 (1970) whereas the spatial coverage of the city increased to 85 square kilometres by 1960 (Garba 2004).

This exponential rate of urbanisation proved overwhelming for the municipal authorities who were unable to efficiently deliver on the required public services. As the number of rural-urban migrants in the city increased, the demand for affordable houses skyrocketed resulting in the mushrooming of informal settlements where most of the migrants found themselves. In these houses, the migrants encountered numerous challenges, such as inability to access water and sanitation services. Other challenges included traffic congestions, inequality in settlement characteristics and inability to access land (Garba 2004). In the late 1960s – just before the oil boom of the 1970s – the government sought to manage urbanisation in Riyadh by enlisting the services of Greek company Doxiadis Associates in preparing a master plan for the city. The contract – signed in 1968 – stipulated that the Master Plan and resultant program would determine the urban development of Riyadh until the year 2000 when it would be reviewed (Doxiadis 1968). The plan proposed an open-ended pattern with a central spine to allow Riyadh experience dynamic growth in proportion to the increase in its population. Noteworthy is that this Master Plan rubber-stamped the urbanisation trends of the 1950s and 1960s. It proposed a grip pattern of urban development, which was archetypal of the design of al-Malaz (Al-Hathloul 2017). Moreover, the plan institutionalised villas as the most desirable housing design. A key weakness of the plan is that it did not project the magnitude of Riyadh's urbanisation in lieu of the oil boom and how the same would impact the city's physical growth.

Subsequently, the population of Riyadh surpassed the 1 million mark by the time the oil boom started in the 1970s. Due to its improved economic fortunes resulting from the oil boom, Riyadh became a common destination for many migrants seeking to improve their livelihoods by securing job opportunities. Indeed, Salam (2013) points out that Riyadh has experienced an exponential population growth over the past four decades owing to rural-urban migration and international migration occasioned by an increase in its urban infrastructures. The urban development was attributed to the increase in government expenditures occasioned by increased revenues from oil exports. This period was also characterised by rapid issuance of building permits by the Municipality. Al-Hathloul (2017) reveals that the local authorities were issuing 12,000 permits per year excluding those issued for government projects, such as medical centres, universities and airport. This resulted in the upsurge of urban development projects, which subsequently attracted many migrants – international and internal – to the city. Unfortunately, this magnified the challenges occasioned by urbanisation, including inability to access essential services, increased demand for housing and increased environmental degradation (Garba 2004). Realising that the Master Plan prepared by Doxiadis had been rendered obsolete by the turn of events, the government enlisted the services of SCET International in preparing a new Master Plan. Following

a holistic evaluation of services in the city, SCET developed a revised phasing and expansion plan that borrowed heavily from the dynamic super grid plan that had been proposed by Doxiadis.

In the aftermath of the oil boom, the population of the city had increased to 2.8 million in 1992. The spatial coverage of Riyadh had also increased to 1782 square kilometres. This expansion of the city's urban boundaries, coupled with increasing population growth, were great hindrances to efficient service delivery (Garba 2004). In particular, the rapid urbanisation has resulted in increased water consumption and decreased water supply. Groundwater resources or water aquifers, which have been a key source of water supply in the municipality, have been rapidly depleted as water scarcity is projected to deteriorate unless the government intervenes (Garba 2004). Other challenges that emerged out of the rapid urbanisation included speculative subdivision of land, increased environmental pollution, uncontrolled urban sprawl, traffic congestion and lack of land ownership records.

3.1.3. History of urban planning in Riyadh

Urban planning in Riyadh began as an afterthought when urbanisation had already taken off in the municipality. Garba (2004) points out that there were no national and local institutional frameworks to guide the urbanisation process. The groundwork for national and local frameworks for urban development was laid in 1953 with the establishment of a Directorate of Municipality within the Ministry of Interior. The directorate – elevated to the Department of Municipal Affairs in 1962 – was tasked with preparing master plans for urban development of towns and communities; development of municipal services; and empowering municipalities to acquire manpower required to run the activities of the different municipalities. Garba (2004) notes that urban planning in the establishment phase was constrained by poor policy planning as well as programme actions that were ad hoc and limited to annual budgets and tackling visible problems. By 1975, the Directorate of Municipality had metamorphosed into the Ministry of Municipal and Rural Affairs (MOMRA), which was responsible for spatial planning at all levels of governance. Furthermore, it was tasked with providing and managing infrastructure as well as undertaking daily management of urban development in different municipalities.

The modern urban pattern of al-Malaz symbolised a form of urban planning that differed from the traditional patterns of the old neighbourhood. Al-Hathloul (2017) reveals that the new pattern differed from the oldest neighbourhood of al-Dirah in the following ways: low density; 50% of the area reserved for private lots; and a large area reserved for streets. Subsequently, the grid street pattern was a model that was replicated by the Master Plans prepared by Doxiadis and SCET International. The Master Plan prepared by Doxiadis Associates proposed a central zone of administrative and commercial business areas that would expand simultaneously as the residential

areas. Furthermore, the Master Plan consisted of a supergrid design running in east-west and north-south pattern, which divides Riyadh into six large areas each consisting of 8-12 localities (Doxiadis 1968). These localities, each measuring 2 x 2 km, were estimated to be the best size for neighbourhoods. The plan also proposed a civic and commercial spine extending to the north and south of the business district as well as an administrative area located perpendicularly to the commercial and civic spine. In addition, the plan identified Wadi Hanifa valley as a natural boundary of the municipality, which would ensure that residential developments occur parallel to the spine of the city. By building on the grid pattern of urban development, Doxiadis' master plan laid the groundwork for uninhibited growth of Riyadh.

However, as aforementioned, the unprecedented growth of Riyadh rendered the initial master plan obsolete. The second Master Plan developed by SCET International sought to improve on the initial master plan (Al-Hathloul 2017). One of the hallmarks of SCET's plan was to extend the supergrid to areas in which development had occurred but had not been initially factored in Doxiadis' Master Plan. Furthermore, the second plan defined the paths for a ring road and formulated the action plans for the construction of King Fahad Road. Other key projects that were integrated into the city fabric by SCET's master plan included National Gauds Campus, airport in the northeast, new neighbourhoods in the east; subdivisions for low income groups in the south west and diplomatic quarters in the west. The difference between the SCET's master plan and that of Doxiadis is that the latter was cognisant of urban growth of the city. Otherwise, SCET borrowed heavily from Doxiadis' plan that sought to make Riyadh a Dynapolis that would expand as its population increased. Nonetheless, one of the shortfalls of this plan is that the proposed ring road contributed to urban sprawl by accelerating mega commercial development instead of restricting it to the central axial spine as had been envisioned in Doxiadis' master plan. The proposed low income subdivision in the west laid the groundwork for human encroachment on the western side of Wadi Hanifa valley. Noteworthy is that Doxiadis' master plan had advised against building residential properties in proximity to Wadi Hanifa considering the unsuitability of the topography (Al-Hathloul 2017). By proposing all main streets to have commercial purposes, SCET's master plan impacted activities within various neighbourhoods, such as increased traffic congestion. This was in contrast to Doxiadis' proposal that each block in the supergrid should have only one main commercial centre to cater the needs of the respective residents.

A haphazard pattern of urbanisation followed as the population of Riyadh continued to increase. Urbanisation was characterised by dispersion of services, poor coordination among government agencies and increased subdivision (Garba 2004). This turn of affairs prompted the Council of Ministers to freeze all land subdivisions in 1986. Twelve years earlier, the Arriyadh Development

Authority (ADA) had been formed to oversee development and renovation projects in Riyadh. Following the freeze on land subdivisions, MOMRA prepared the Urban Growth Boundaries (UGB), a national program to improve urban development in 100 cities within KSA. It had three main goals: regulation of urban sprawl; improve coordination to minimise costs of providing infrastructure; and natural resource management in the municipalities. Subsequently, ADA adopted UGB and went about implementing the goals of this program in three phases. The first phase was to create approximately 13,000 hectares of an open area of development, which would increase to 51,680 hectares in the second phase (Al-Hathloul 2017). The third phase encompassed a protection zone for development. Whereas the municipality provided utilities and services in the first phase, this responsibility was assumed by private developers in the second phase. Nonetheless, some developers defied the goals of the UGB program by subdividing their land during the first phase while providing infrastructure and utility. One of the major contributions of the UGB programme is that it provided an institutional foundation for the provision of infrastructure by the private sector.

3.1.4. Urban planning in Riyadh

Urban planning in Riyadh currently reflects the overall urban planning in KSA in that it is based on a technocratic model of policy making that does not place much emphasis on delivery of services. As indicated in Figure 3-7, urban planning begins at the pinnacle of governance, which is in the central government that is headed by the king of Saudi Arabia. The central government consists of several ministries that are concerned with urban planning, such as the Ministry of Housing, Ministry of Municipal and Rural Affairs (MOMRA), Ministry of Transport and the Ministry of Economic Planning (MOEP). These ministries work in conjunction with the High Commission for the Development of Arriyadh (ADA). At the regional level, the urban planning process falls on the regional council headed by prince (governor) of the region. Apart from the governor, the council consists of one member each from the ministries of interior, MOMRA, health, transport, education, transport as well as a member of the Arriyadh Municipality (AMANAH).

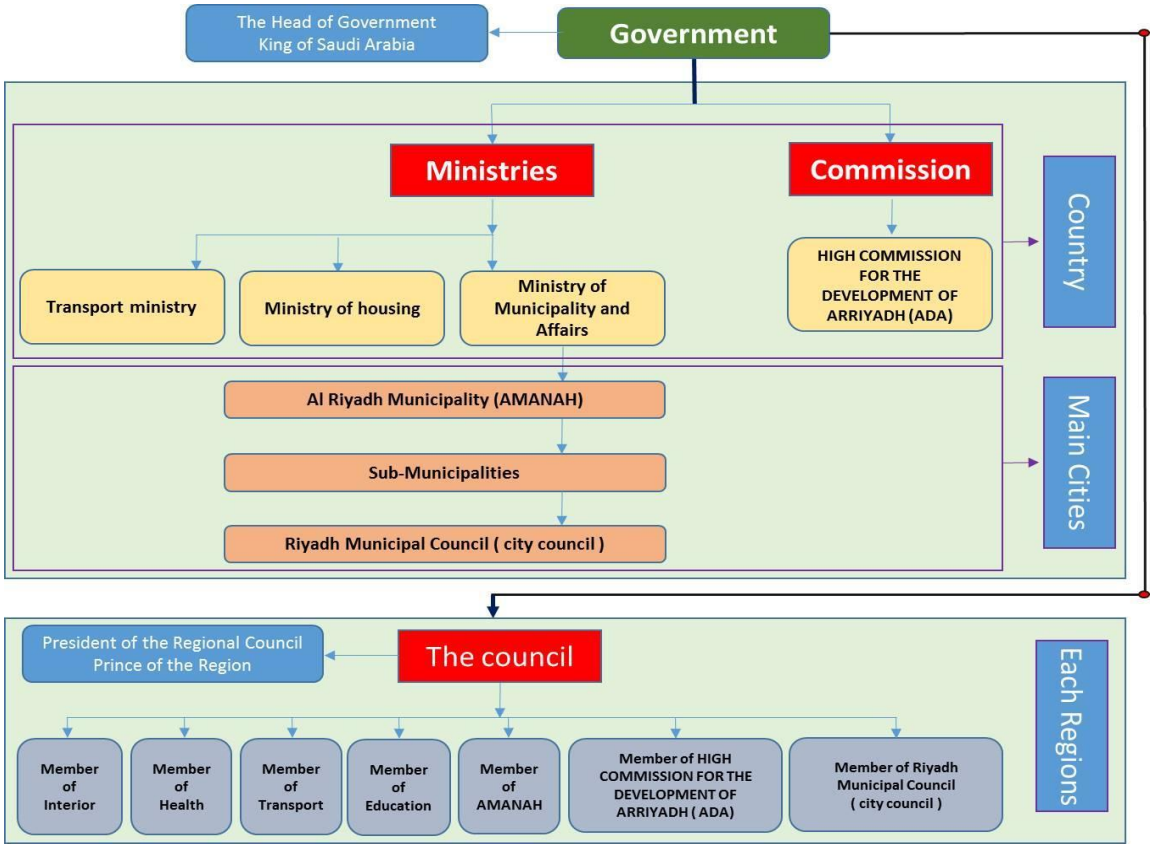


Figure 3-7: Structure of the urban planning in KSA (ADA, 2013)

According to Future Saudi Cities Program (2016), the regional plans focus on development projects in the core city in addition to providing essential infrastructures in the wider administrative areas. Furthermore, as is the case with other regions, the regional plans in Riyadh differ widely

from national plans, such as the National Spatial Strategy (NSS) and the National Spatial Plan (NSP) and thus there is a disconnect among the three. NSS – first initiated by MOMRA in late 1970s – seeks to foster balanced and equitable development across the different regions in KSA. Following its revision in 2000, NSS seeks to bolster the social, economic and ecological resilience of KSA via the following strategies: effective land use management, social upgrading and economic development.

3.1.5. Current Situation of Urbanisation in Riyadh

In the Arriyadh region, the regional policy making structure insofar as urban planning and development is concerned consists of the Governorate at the helm. The governor is the regional council and the heads of counties; the latter consists of heads of regional government agencies and certain members of the public whereas the heads of counties is composed of the heads of the region's counties. Whereas the heads of counties are tasked with overseeing security matters in the region, the regional council oversees development matters (Future Saudi Cities Programme 2016). Below the two centres of power is the High Commission for the Development of Arriyadh (HCDA). It is composed of high-ranking executives at the national government and the regional mayoralty as well as three businesspersons nominated to the council.

The functions of HCDA include planning and coordination of infrastructure projects; supervision of significant projects in the region; and formulation of planning and land use regulations. One of the latest initiatives by ADA were aimed at improving urban development is the Metropolitan Development Strategy for Arriyadh (MEDSTAR) project. Initiated in the late 1990s, the project was informed by the rapid urbanisation of Riyadh that was experiencing an annual population growth of 8% (Al-Hathloul 2017). Indeed, the population of the municipality is projected to increase to 10 million by 2020. MEDSTAR projects a 50-year vision for Riyadh that entails the restructuring of the city through an urban development strategy. The strategy encompasses a Metropolitan structure plan; urban management plan; implementation instruments and programs; and sectoral policies (Al-Hathloul 2017). As indicated in Figure 3-8, the Arriyadh Metropolitan Structure Plan 2030 seeks to spatially restructure Riyadh into a multi-centre system, which entails maintaining the major services and employment in central regions whereas locating new concentration in new development regions. Al-Hathloul (2017) mentions the following proposals as having the biggest impact on urbanisation in Riyadh: suburban cities catering for 1 million residents; five metropolitan sub-centres to cater for residents in the outskirts of the city centre; and development of a public transportation system. Apart from providing essential services to residents in the outskirts of the city centre, it is expected that the sub-centres will provide employment, decentralise city management and reduce trips to the city centre. The sub-centres will comprise

public and private sector activities including offices, companies, economic activities, socio-cultural and recreational activities as well as administrative activities. On the other hand, Riyadh urban planning authorities expect that the suburban cities will enhance a controlled growth model in the municipality as a whole and connect to the city centre through a metro transit system. The proposed Riyadh Public Transport Network (RPTN) was necessitated by the increase in private automobiles, which have greatly contributed to air pollution and traffic congestion (Al-Hathloul 2017). It is composed of Bus Rapid Transit (BRT), park and ride facilities, feeder buses as well as community bus lines. The project, to be completed by the end of 2018, was expected to reduce dependence on private automobiles as the only modes of transportation in the city and by extension, air pollution.

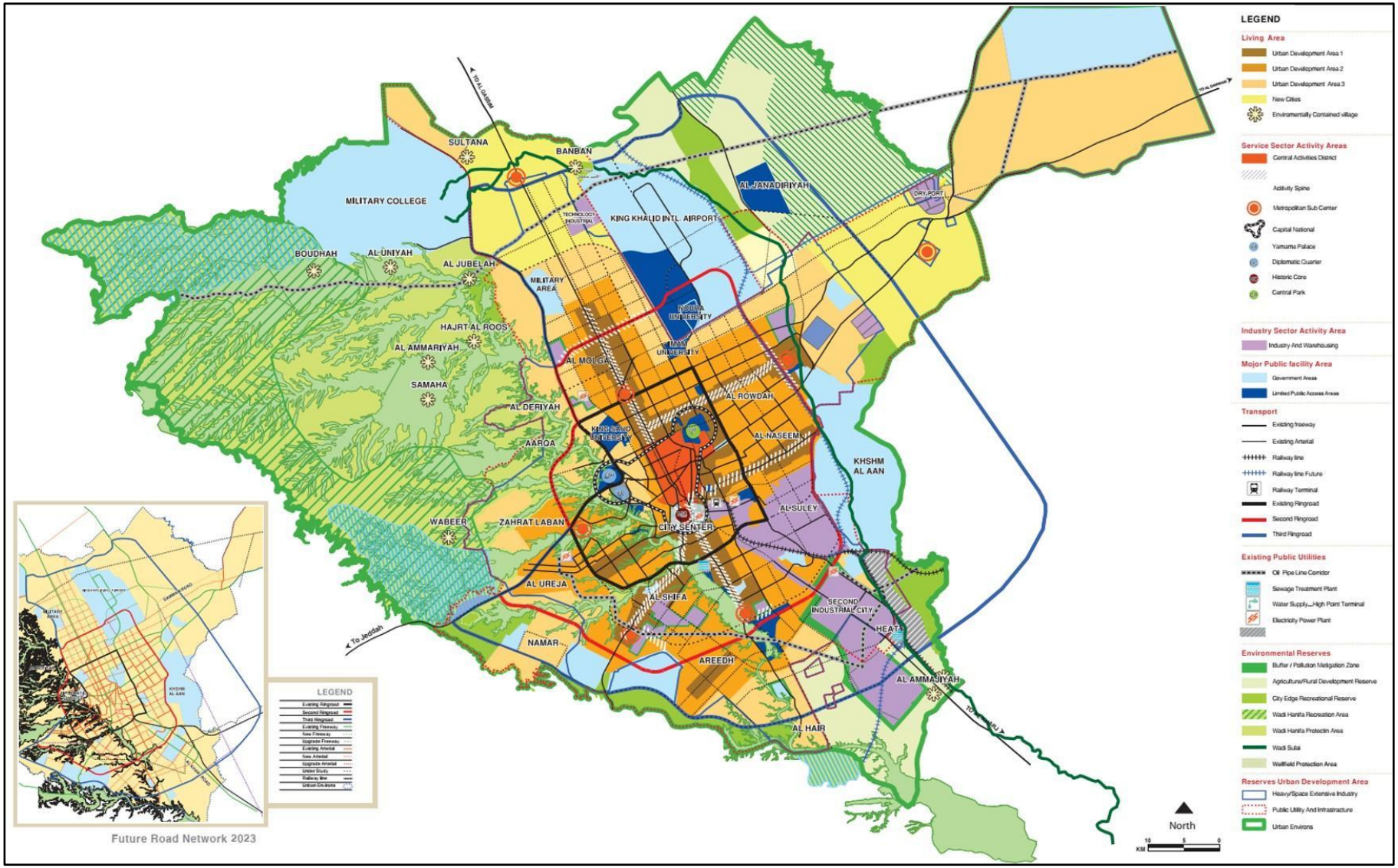


Figure 3-8: Arriyadh Metropolitan Structure Plan 2030 (MEDSTAR, 2010)

As indicated in figure 3-9, the urban boundaries of the city have continued to expand with the growth in the population. Statistics from UNHABITAT (2018) indicate that urban extent of the city had increased to 127, 805 hectares by 2013. The urban extent has been increasing at annual rate of 5% since the 1990s. Furthermore, the total amount of built-up area that was added to Riyadh was 50,422 hectares in a period of 13 years (2000-2013). Out of this added area, infill constituted 25%, extension (66 percent) and inclusion (9 percent). In comparison, the total amount of built-up area added to Riyadh between 1990 and 2000 was 15, 190 hectares (UNHABITAT 2018). This proportion was divided as follows: infill (36 percent); extension (43 percent); leapfrog (0 percent) and inclusion (21 percent).

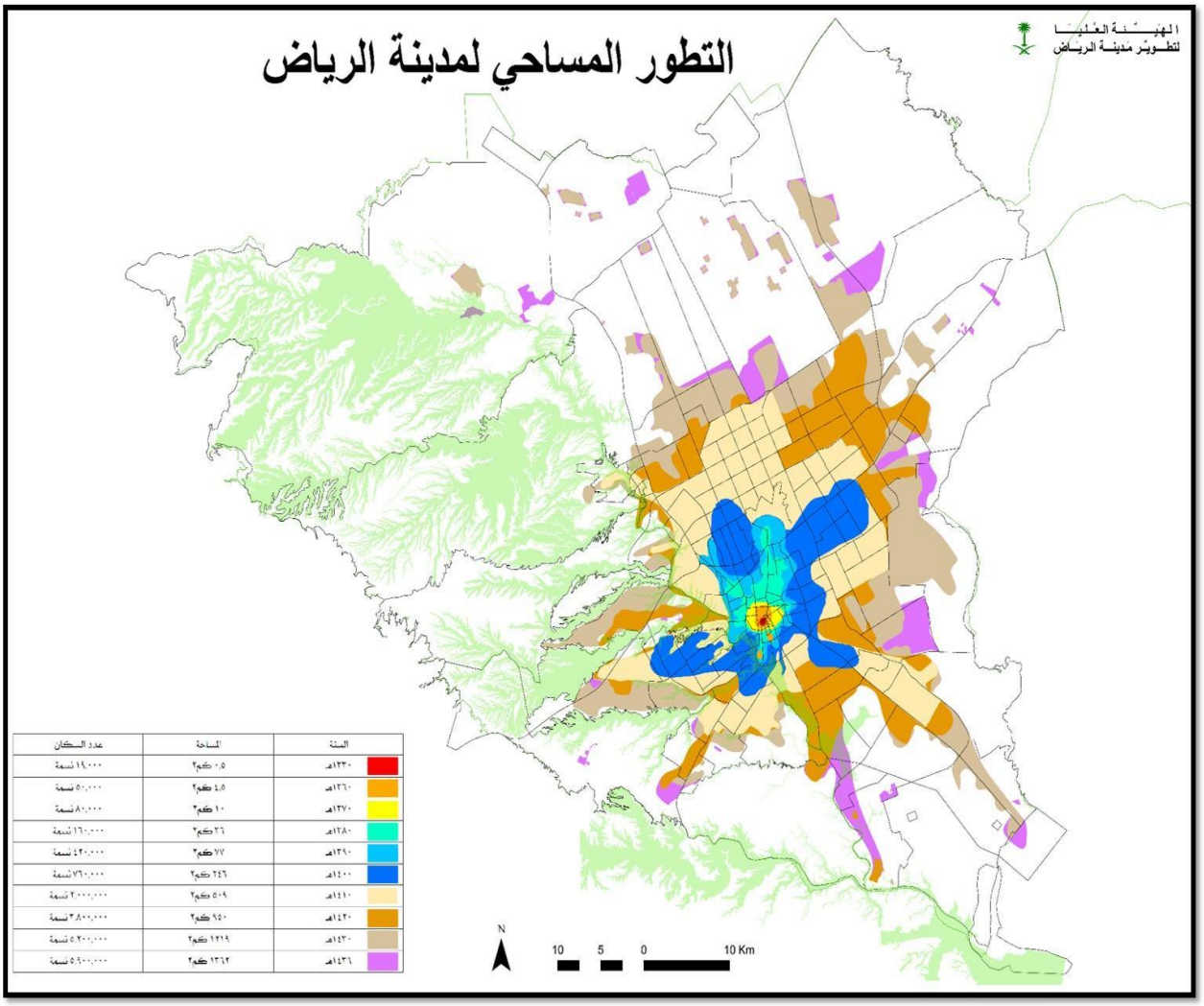


Figure 3-9: Riyadh's Expansion from 1912 to 2014 (ADA, 2015)

3.1.6. Summary of Sustainable Urbanisation Process in Riyadh

Despite the efforts at improving urbanisation in Riyadh by mitigating its side effects, urban planning in the region has still been bedevilled by various administrative challenges. One of these has been the lack of coordination between the agencies tasked with urban planning at the local, regional and national levels. Future Saudi Cities Program (2016) notes that the poor inter-organisational collaboration between different agencies has occasioned a misalignment between the master plans coordinated by MOMRA and the implementation of the same at the local level. Another challenge that has been encountered by urban planners is the changing land use classifications. This has been evidenced through development projects that have been undertaken in areas that are not designated for investment (Future Saudi Cities Program 2016). There is also poor information sharing among the agencies concerned with urban planning at the different levels of governance, which has resulted in the different urban planners working at cross purposes. Outdated planning policies have also been an impediment to effective urban planning and development. These policies are not flexible enough to cater for the changing demographic and socio-economic circumstances in Riyadh. In addition, urban planners at the regional and local level have been unable to harness the socio-economic potential because of the restraints placed by NSP. Future Saudi Cities Program (2016) further identifies the low levels of public awareness on planning laws and legislations as a barrier to effective urban planning in Riyadh and other cities in KSA. These low awareness levels have consequently contributed to low public participation in urban planning processes, such as policy formulation and other forms of decision making. Implementation of master plans developed at the national level has also been constrained by the changing urban growth boundaries occasioned by increasing development projects, such as residential properties.

The following are the critical points that have emerged from the analysis of urbanisation in Riyadh:

- The designation of Riyadh as the capital city of the newly formed Kingdom of Saudi Arabia was integral in kick starting the urbanisation process. The government centred its attentions on it insofar as infrastructural developments are concerned;
- The government's adoption of Western architectural design in the construction of al-Malaz was pivotal in influencing Riyadh residents to move away from Islamic architectural planning and design in favour of urban sprawl and the villa designs for their houses;
- The youth will be integral in adoption of sustainability practices considering that they constitute the majority of residents. Considering that the increased life span in KSA and Riyadh, the current youth will be integral in determining whether the current sustainable

urban planning efforts will be successful or not. This will be dependent on whether they inculcate the same sustainability practices on their offspring or future generations;

- Urban planning is a trial and error process where cities learn to adopt sustainable ways of urbanisation as time passes. This was the case with many cities in the developed countries especially during the industrial revolution;
- The success of MEDSTAR will be integral in the successful adoption of sustainable urban planning in Riyadh. It will go a long way in countering the side effects of the rapid urbanisation while exploiting the opportunities brought on by it; and
- As the population of Riyadh increases, its urban boundaries will continue to expand and enhance its status as a megacity.

3.2. Review of Policy Documents and Reports on Sustainable Urbanisation in Riyadh

This section presents the findings of an analysis of policy documents and reports on sustainable urbanisation in Riyadh and Saudi Arabia in general. The findings relate to the six themes of the entire study. Analysis of the literature was undertaken by comparing these documents with other studies as well as the findings of the interviews with Riyadh residents, government experts as well as academics.

3.2.1. Method

The literature analysed were first identified using a desktop study, which involves summarising, collating and synthesising existing research on a specific topic. The government agencies from which these documents were identified included the Arriyadh Development Agency (ADA), the Ministry of Municipal and Rural Affairs (MOMRA) and the General Authority for Statistics. Furthermore, reports on sustainable urbanisation in Riyadh were collected from international agencies, such as the United Nations Development Programme (UNDP), United Nations Environmental Programme (UNEP), UNHABITAT as well as HOK. In this particular study, the research topic that guided the collection of the literature was "Sustainable Urbanisation in Riyadh". The literature search used the six themes of the study – around which the interview questions were formulated – to look for the literature. Subsequently, these themes were the variables, which guided the desktop study. Examples of the documents identified through the desktop study included national surveys, working papers, white papers, government documents and reports. These documents further enhanced the researcher's understanding of the institutional structure of Arriyadh as far as urban planning and implementation is concerned. As Figure 3-10 indicates, the Governor is the highest authority in governance of the region and is assisted in steering the urbanisation process by other institutions, such as the Regional Council, ADA, HCDA and the

heads of counties. After the literature search, the literature was then analysed to identify some common themes or issues with regards to the research questions for this research.

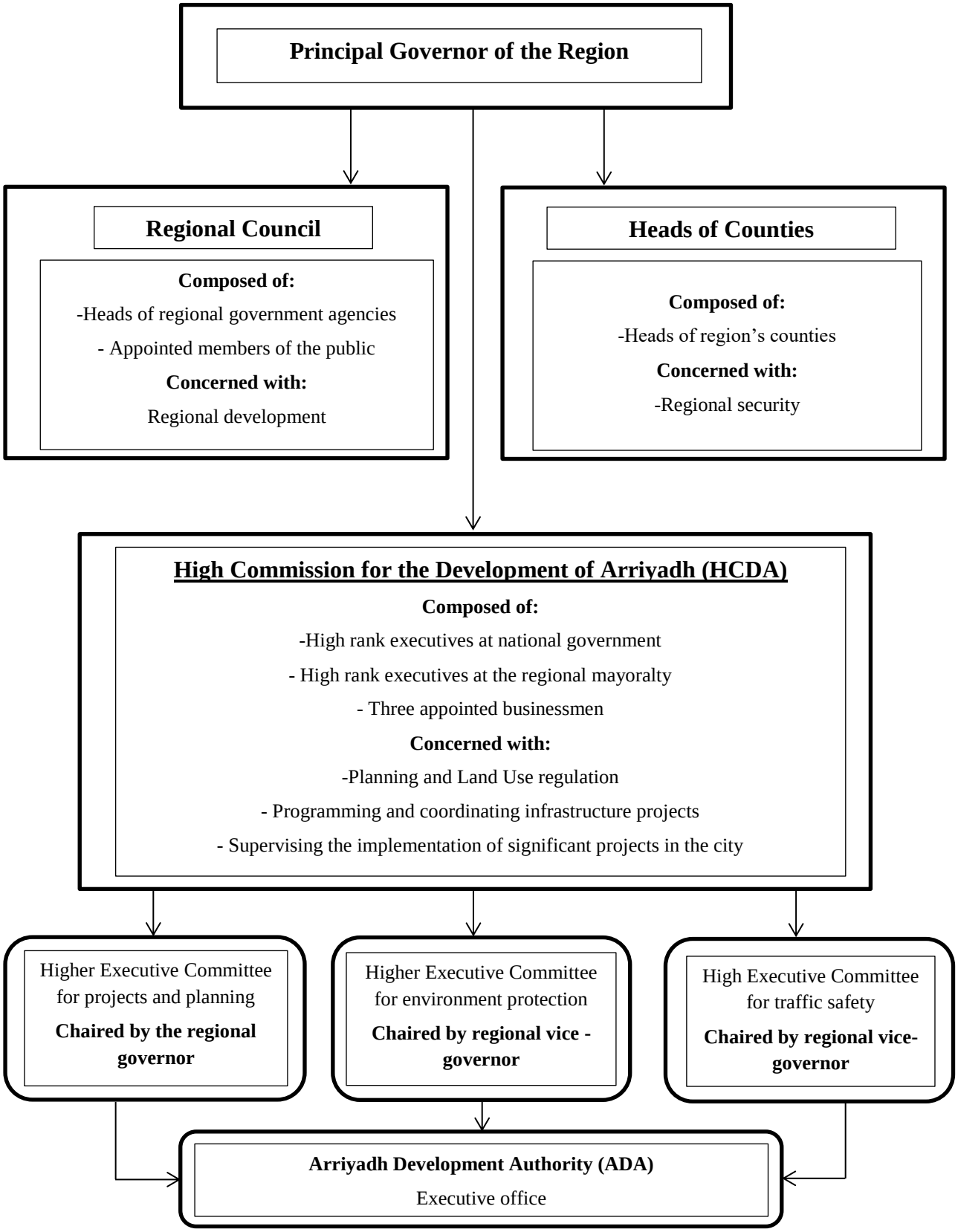


Figure 3-10: Institutional structure in Arriyadh region (Source: Althabt 2013, p. 211)

3.2.2. Analysis

3.2.2.1. Drivers and Barriers of Sustainable Urbanisation

3.2.2.1.1. Barriers of sustainable urbanisation

- *Outdated means of communication*

An analysis of the literature identifies outdated means of communication as the major barrier of sustainable urbanisation in Riyadh insofar as policies and guidelines are concerned. The documents analysed indicate that urban planning regulations are outdated and not cognisant of the changing landscape of Riyadh, including the rapid population growth, demographic changes, cost of living and prevailing urban sprawl. In its study on the current urban planning regulations in Saudi Arabia, for instance, UNHABITAT (2016) notes that the municipalities have been incapacitated in their functions because of weak laws that do not give them the leeway to perform their duties.

> *"This law consists of five chapters and 49 articles which have not been updated since the date of issuance of this law. The law deals with the powers and functions of the Minister of Municipal and Rural Affairs, mayors and heads of municipalities and municipal councils, in addition to municipal finance sources and rural affairs" – UNHABITAT (2016, p. 18).*

Apart from UNHABITAT, other studies have also pointed out that the municipalities/local government have been unable to conduct their functions effectively due to weak laws and centralisation of decision making. Bajaber (2017) for example, notes that the law renders municipalities as agents of the central government and not as semi-autonomous entities that can undertake initiatives to improve services to the citizenry, such as in the case of sustainable urban planning. The study, titled Unbalanced Saudi Arabia, provides a chronological account of the city-size distribution of KSA cities from 1989-2010. It investigates the factors that influenced the size distribution of these cities during this period. The author concludes that most of the Saudi population resides in three major cities, which consequently contradicts one of the objectives of the national 5-year national development plan, which is balanced growth across the country (Bajaber 2017).

While focusing on the outdated policies and guidelines, most of the official documents have further acknowledged the difficulties encountered in the implementation of the same policies. One such study is that of UNHABITAT (2016) in which it notes that the implementation of urban planning legislation has been hamstrung by the non-participation of state agencies that are tasked with the implementation of these policies.

> *"The National Spatial Strategy has been approved in 2001 and lack implementation programs for monitoring and evaluation so it had been subject to updating in 1437 H to avoid shortcomings caused by non-participation of various state authorities and bodies, as well as development of implementation program to carry out the process of following-up and evaluation" – UNHABITAT (2016, p.20)*

Jointly developed in August 2000 by the Ministry of Economy and Planning (MoEP) and MOMRA, the National Spatial Strategy (NSS) aims to facilitate balanced development between regions majorly through the integration of rural and urban areas. However, its implementation has been bedevilled by poor coordination between the different levels of governance insofar as horizontal and vertical integration is concerned. UNHABITAT (2016) notes that the poor coordination of the implementation of NSS is closely tied to lack of a reporting mechanism, which have further hindered effective dialogue among the ministries tasked with implementing NSS. Poor vertical integration of NSS has also been afflicted by poor coordination between the national government and the regional/sub-regional levels of government. Consequently, most of the urban planning that occurs at the regional and sub-regional levels does not integrate the objectives of NSS. UNHABITAT (2016) attributes the mismatch in the implementation of NSS to limited knowledge of the strategic plan owing to poor communication on the same. Problems related to implementation of policies can be attributed to the lack of clarity among various agencies insofar as their respective duties and responsibilities are concerned. There are various instances in which an agency is working independently of another one even though their close cooperation is necessary for the achievement of the urban planning objectives (Bajaber 2017). A case in point is where the agency tasked with developing a plan for the city develops a plan without the input of the agency tasked with implementing the plan.

- *Environmental pollution*

This analysis also identifies environmental pollution as a major barrier of sustainable urbanisation. The picture painted by the documents, which highlighted the issue of environmental pollution, is that the stakeholders in Riyadh have not appreciated the need to conserve the environment and have instead engaged in unsustainable practices. Examples of the unsustainable practices that have harmed the environment include poor waste management, groundwater depletion and air pollution/air quality. In its policy paper, ADA (2010) earmarks air pollution as one of the core challenges confronting Riyadh.

> *"The city is facing another challenge regarding air pollution. The dense and increasing traffic movement in the city and other pollution generators" – ADA (2010, p.17).*

Indeed, the fact that Riyadh is experiencing increased air pollution is not surprising considering the increasing private car ownership in the city. This has led to traffic congestion and subsequent emission of greenhouse gases into the environment. The report by ADA provides an in-depth account of the issues that have emerged from the rapid urbanisation in Arriyadh and the future plans to transform Riyadh into one of the most sustainable cities in the world as part of the Metropolitan Strategy for Development of Arriyadh (MEDSTAR). In another one of its studies, ADA (2015) projects that the vehicular trips in the city are expected to peak at 12 million per day in the next one and half decade. This represents almost a 50 percent increase from the 7.4 million vehicular trips per day as at 2015. Greenhouse emissions from exhaust fumes are one of the top causes of air pollution in Riyadh – the other ones being emissions from industries. This report, while acknowledging the aforementioned challenges, seeks to enlighten potential investors on the investment opportunities found within the larger Arriyadh municipality.

In its research report, UNDP (2012) states/highlights the effect of excessive groundwater usage on the water table.

> *"Urbanisation also displaces open space such as farmland, wetlands, parks and forests and reduces water supply as excessive groundwater usage depletes water tables," – UNDP (2012, p. 21).*

The effect of urbanisation on water management has been well documented by several studies and reports. One of these reports is the State of the Environment Report 2017 Report by the General Authority of Meteorology and Environmental Protection (GAMEP); the report sought to outline Saudi Arabia's environmental needs and aspirations. The report highlights the environmental issues facing Saudi Arabia in the following domains: air quality, biodiversity, water resources, environment management, atmosphere and environment for development. According to GAMEP (2017), groundwater depletion is attributable to the increasing levels of water consumption owing to the increased population in Riyadh. This has increased the level of water scarcity since the water supply cannot keep up with the demands. Wadi Hanifa, for long a source of groundwater supplies, has borne the brunt of urbanisation as people encroach into the valley. The problem has worsened by dumping of waste, which seep into the ground and pollute the groundwater resources in this valley (Muneerah 2015).

3.2.2.1.2. Drivers of sustainable urbanisation

- *Economic boom*

Most of the literature analysed identify the economic boom in Saudi Arabia as the main driver of sustainable urbanisation in Riyadh. This boom is attributable to the fact that Saudi Arabia is one of the top exporters of oil in the world. It follows then that oil revenues would provide the city

with the financial resources for implementing sustainable urbanisation projects. For instance, UNDP (2012) makes note of how economic dynamism in cities holds great potential for livelihood opportunities.

> *"The economic dynamism of cities provides livelihood opportunities and social mobility possibilities not found in rural areas" – UNDP (2012, p.10).*

This statement by UNDP is a reflection of Riyadh, which has become one of the most-sought after cities in the Gulf region when it comes to livelihood opportunities. The city has not only experienced rural-urban migration but also international migration as people from other countries come to work in the city. Indeed, the number of international migrants in Saudi Arabia had peaked at approximately over 12 million as at 2018 (General Authority on Statistics 2018). Consequently, Al-Surf et al. (2013) attribute the rapid population growth in Riyadh to the influx of a foreign workforce into the city.

Some of the official documents also highlight an increased involvement of the private sector as a contributor to economic boom, which will consequently help spur sustainable urbanisation initiatives. ADA (2010) for instance, mentions how increased private sector contribution will improve the city's development.

> *"The increase of the private sector contribution in the city development as a result of expected decrease of government investments in the city will encourage innovations and look for advanced means and ways to finance the urban development processes," – ADA (2010, p.41).*

Noteworthy, privatisation is one of the four pillars of the National Transformation Plan (NTP) 2020 whose objective is to enhance the institutional capacity and capability for attaining the objectives of Saudi Vision 2030. Under privatisation, the aim is to ensure that the involvement of the private sector in provision of various services increases whereas the government involvement decreases (Al-Surf and Mostafa 2016). It is further noteworthy that one of the ways suggested by government representatives – insofar as integration of sustainable urbanisation into future development is concerned – is increasing public-private sector cooperation. Al-Kibsi et al. (2015) point out that public-private sector cooperation would provide the government with extra funds to undertake various development projects. Furthermore, the private sector could provide innovative approaches to make the projects sustainable in addition to increasing employment opportunities for the unemployed youth. Sponsored by McKinsey Global Institute (MGI), Al-Kibsi et al. (2015) study seeks to develop a model comprising several dimensions including public finance, economy

and the labour market in order to understand the impact of the changing external and internal conditions of KSA on the country.

3.2.2.2. Improving the quality of life

- Gender and income inequality

Most of the literature analysed highlight the importance of enhancing gender and income equality as one way through which sustainable urbanisation can improve the quality of life for Riyadh residents. Advancements in the development of education infrastructures around Saudi Arabia has seen many Saudi youth – particularly women – access more opportunities to better education. However, income inequality continues to raise concerns for the central as well as the local government especially with regards to increasing unemployment. In his paper, Bertrand Renaud, a consultant and a former adviser at the Financial Development Department at the World Bank, seeks to examine urban dimensions of sustainability and resilience within the Middle East and North African (MENA) region that includes Saudi Arabia. Renaud (2016) highlights the need for an inclusive business environment to allow everyone a chance at economic prosperity.

> *"Creation of an enabling environment for sustainable and inclusive business and philanthropy including informing national and urban economic development policies and plans," – Renaud (2016, p.23)*

The data on the exact extent of the income inequality in the kingdom is unavailable but data on the wealth inequality justifies why there is need for income equality. Foran et al. (2014) for example, note that KSA belongs in the same league as the United States (U.S.) and Russia as far as wealth inequality is concerned. Al-Khattany (2015) warns that the prevalent unemployment situation in the kingdom, coupled with a lack of economic reforms, may just be a ticking time bomb that may push millions of the unemployed youth to the edge.

The official documents that pay attention to gender equality note the need to provide women with opportunities that have been likewise provided to men. For example, Renaud's (2016) study notes how gendered migration has compelled the women left behind in the rural areas to take charge of their households while the man is away in the city.

> *"Gendered migration patterns may provide opportunities to promote greater social, political and economic empowerment for women. Where men migrate to urban areas, opportunities may arise to mobilize and capacitate rural women to play greater roles in the rural economic and political spheres" – Renaud (2016, p.26)*

Gender equality is an issue that has received prominence in many platforms, including research, media as well as political spheres as far as Saudi Arabia is concerned. Alsaleh (2012) disagrees

with the Western notion that KSA is the epitome of gender inequality by reiterating that Saudi women play an integral role behind the scenes, especially in their households and in the political circles. In his opinion, it is not necessary for women to be seen publicly fulfilling their duties or exercising their responsibilities for people to consider them as being treated equally as their male counterparts.

It is noteworthy that the Saudi government has made considerable efforts to improve gender equality by appointment an additional number of women in various levels of government. Since 2012, women have been allowed to vote in elections – including municipal elections – which give them a bigger say in the running of the municipality insofar as urban planning is concerned. Furthermore, the Ninth Development Plan includes a chapter outlining strategies for increasing female participation in various aspects of the society (MOMRA 2013). These efforts at enhancing gender equality certain bode well for sustainable urbanisation efforts. By allowing their voices to be heard regarding the various issues affecting the municipality, women can accelerate the adoption of sustainable practices among the populace, including renewable energy, proper waste disposal and participatory governance (UNHABITAT).

- *Cleaner environment*

Majority of the literature analysed identify a cleaner environment as a by-product of sustainable urbanisation. One of the most highlighted issues insofar as a cleaner environment is concerned is waste management. Riyadh has been guilty of using outdated methods of waste disposal that are environmentally risky. Anjum et al. (2016) note that the continued use of congested landfills may result in emission of methane gas and subsequent pollution of groundwater resources. The authors make this conclusion after reviewing the waste disposal system in Saudi Arabia and how poor waste disposal has environmentally impacted the country. On the other hand, Renaud (2016) proposed the adoption of the sustainable practice of waste-to-energy as a way of managing the waste disposal problem.

> *"Cities also present unique opportunities for developing innovative waste management such as waste-to-energy technologies (e.g. methane from landfills), reusing and recycling as an economic opportunity and ecosystem-based sewage treatment" – Renaud (2016, p.27)*

His suggestion echoes that of Anjum et al. (2016) who propose the use of anaerobic digestion methods to convert organic waste into liquid fuels. They further propose the adoption of pyrolysis technologies for converting non-biodegradable waste, such as plastic, into value-added products, such as gases, char and fuel oil. Similarly, UNDP (2016) notes that modern waste management

strategies, such as waste-to-energy, recycling and reusing will not only conserve the environment but also present economic opportunities. The use of these technologies may provide employment opportunities for many young people in the city.

3.2.2.3. Environmental, Social, and Historical Factors Affecting Sustainable Urbanisation

3.2.2.3.1. Social factors

- *Socioeconomic statuses*

The number one social factor that will affect sustainable urbanisation is socioeconomic statuses of Riyadh residents. Most of the literature analysed identified issues, such as income levels, health and education as social factors that will affect the success or failures of sustainable urbanisation. Regarding income levels, UNDP (2012) warns of the growing levels of urban poverty that may reach peak levels by 2035.

> *"Urban poverty is growing and the World Bank estimates that, by 2035, most of the world's extreme poor will be found in urban areas," – UNDP (2012, p.20).*

This estimate by the World Bank should be a wake-up call to cities, such as Riyadh, which are increasingly witnessing an influx of rural migrants. As these migrants troop to the city, they may be shocked to discover that life in the city is not as rosy as has been painted. One of the common challenges that have been witnessed in Riyadh has been unemployment of the youth millions of who have not been able to find employment in the public sector. The challenge is further compounded by the fact that employment in the private sector has majorly favoured the foreign workers even though the Saudization policy bears much promise for the future as far as job opportunities are concerned (Foran et al. 2014).

Nonetheless, ADA (2010) recognises the impact that unemployment has on the living conditions of those affected. In the end, people who are jobless may not contribute wholeheartedly to the attainment of sustainable urbanisation.

> *"Unemployment rate will go up leading to deterioration of living conditions of the population" – ADA (2010, p.7).*

Indeed, one of the challenges that Saudi Arabia portends is in the adoption of renewable energy systems. GAMEP (2017) notes that the lack of awareness on the benefits of renewable energy technologies has fuelled the notion among many residents that these technologies are costlier than the use of fossil fuels and other non-renewable energy systems.

- *Social inclusion or exclusion*

The literature analysed also identified social inclusion (or exclusion) as another social factor that will impact sustainable urbanisation. These documents pointed out the fact that resource

distribution in Riyadh – and indeed in Saudi Arabia – has been skewed in favour of the wealthy people in Riyadh. Likewise, Renaud (2016) decries the increasing spatial inequalities between and within cities.

> *"Cities are confronted with increased spatial inequalities within cities and between cities. With rapidly growing populations and limited land, the spatial planning choices cities make can risk creating 'ghettos' of concentrated poverty, crime, unemployment and limited basic services" – Renaud (2016, p. 27).*

Riyadh is an example of a city that is fraught with spatial inequalities as far as infrastructures are concerned. This has been exemplified in the case of spatial distribution of health facilities across the city. Mansour's (2016) study notes that health centres are clustered in districts within the central parts of Riyadh Governorate. On the other hand, there is a low density of health facilities in the districts located in the marginal parts of the governorate. Residents in the latter areas are forced to travel long distances in search of public health care (Mansour 2016). Similarly, Alhowaish et al. (2018) note that primary healthcare centres in the public sector and polyclinics in the private health sector are inequitably distributed across Saudi Arabia. Noteworthy is that the current privatisation of the healthcare system will help cure the problem of spatial inequality insofar as health is concerned. Nonetheless, this process should be geared towards making healthcare affordable, available and high quality for all citizens (Alhowaish et al. 2018).

Spatial inequalities between cities explains why big cities, such as Riyadh, Jeddah and Dammam have become attractive destinations for internal migrants who troop to these cities in search of job opportunities and improvement of their livelihoods. As a result, these cities have been confronted with a challenge of a shortage of affordable housing, which has resulted in the growth of unplanned settlements that are home to many of these migrants (Al-Surf et al. 2013).

The official documents also mention the possible repercussions of continued social exclusion of poor people. UNDP (2012) for example, raises an alarm over the risk of gang wars, civil unrest or riots due to failure to deal with social exclusion.

> *"Limited public space for city residents to access and limited opportunities for the public to influence decision-making regarding public space or land use expose cities to the risk of future internal conflict (gang violence, riots, civil unrest) and social exclusion based on a population's immigration or socio-economic status" – UNDP (2012, p.18).*

This warning by UNDP is reminiscent of another warning by Al-Khattany (2015) who warns that many of the millions of unemployed Saudi youth may grow frustrated by their situation and find themselves adopting anti-social behaviour.

3.2.2.3.2. Environmental Factors

- *Land use*

According to the literature analysed, land use is the major environmental factor that will impact sustainable urbanisation in Riyadh. The increasing urbanisation has created a high demand for land for building residential and commercial properties. ADA (2010) notes that this will not bode well for the city's vegetation cover.

> *"The vegetation cover in areas adjoining the urban growth deteriorates due to aggressive grazing and other uncontrolled recreational activities," – ADA (2010, p.17).*

Likewise, GAMEP (2017) notes that urban expansion has negatively affected forest areas in Saudi Arabia as more areas are cleared for constructing residential and commercial properties. They are vulnerable and fragile ecosystems that have been adversely affected by infrastructural development, unsustainable investments and tourism expansion put them at the risk of deforestation (GAMEP 2017). In Riyadh, in particular, the urban expansion was precipitated by the construction of King Abdulaziz's palace outside of the city walls in the 1930s. Al-Hathloul (2017) notes that what followed was an expansion of the city's urban boundaries as more residential properties were built in the outskirts of the central district in response to the increase in population. ADA (2010) further points out the threat posed to wildlife and natural resources by the changing land use.

> *"The wildlife, soil and agriculture will also suffer from the spread of urban and the resulting activities which lead to the extinction of many types of wildlife despite the rarity of this wildlife in the desert environment and the loss of wide areas of arable lands within partially the urban context" – ADA (2010, p.17).*

Indeed, Wadi Hanifa valley provides the appropriate example of how the changing land use has affected natural resources. The valley has experienced accumulation of garbage dumped by the urban population living around it whereas other people have started encroaching on the valley in search of space for building residential buildings (Abdallah 2017). Safeguarding the country's natural resources and wildlife requires public-private sector collaboration to ensure sustainable development that does not harm the country's natural resources (GAMEP 2017).

3.2.2.4. Impact of rapid urbanisation on desert and arid lands

- Environmental degradation

The biggest impact of rapid urbanisation on desert and arid lands as identified during the analysis of the literature is environmental degradation. The various documents highlighted wastewater pollution, groundwater depletion, climate change and air pollution as some of the forms of environmental degradation witnessed as a result of urbanisation. As will be outlined in subsequent

chapter, Riyadh residents as well as government experts similarly mentioned poor waste management, environmental pollution and natural hazards as some of the effects of rapid urbanisation on desert and arid lands in Riyadh. Renaud (2016), for instance, notes that global warming poses a huge threat to agricultural land.

> *"Nationally, Saudi urban sustainability faces four major natural risks: global warming, water, energy and food. Climatic conditions over the 2.2 million km2 of Saudi territory minimize the role of agriculture with 1.4% of arable land, 4.7% share of employment and a 2% share of GDP" – Renaud (2016, p.15).*

Agricultural activities in Riyadh have been inhibited by the unfavourable climatic conditions, limited agricultural land as well as scarce water resources (GAMEP 2017). Noteworthy is that agriculture has been responsible for the increased depletion of water resources – groundwater resources in particular. A report by Dube (2017) reviews Saudi Vision 2030 efforts to minimise excess water consumption and the increased use of desalination plants as well as water reuse. The author, who works with the Water Environment Federation (WEF), provides insight into the water scarcity challenge in KSA and the causes of this water scarcity. For example, many groundwater resources were depleted and misused to irrigate many wheat farms during a period in which Saudi Arabia experienced a wheat boom (Dube 2017). The water scarcity problem has however refused to abate even after the country ceased production of wheat. Similarly, ADA (2010) sounds the warning bells regarding the effect of urbanisation on groundwater levels in the desert and arid areas.

> *"This will lead to more pollution of underground water and will expose the general health to danger, in addition to loss and waste of water resources" – ADA (2010, p.17).*

It is in recognition of this danger that efforts are being undertaken to prevent the pollution of non-renewable water sources, such as groundwater. There is need for an integrated management of water resources to ensure prudent water management, such as prevention of the pollution of water resources, including renewable and non-renewable groundwater as well as flood water (GAMEP 2017). These efforts are timely considering the fact that water scarcity may worsen in the coming years as the population of Riyadh – and Saudi Arabia in general – continues to increase at a rapid rate. In fact, estimates indicate that the natural water resources in the kingdom, including groundwater resources, may be completed depleted in the next two decades (Dube 2017).

- Inconsistent government responsibility

The official documents also point out that the increasing urbanisation has propagated inconsistent government responsibility as far as desert and arid lands are concerned. It implies that the

administrative challenges previously faced by local government officials have grown two-fold with the expansion of the urban land area of the city. For example, ADA (2010) acknowledges the increasing challenges related to the provision of public facilities.

> *"The city is facing a shortage in public facilities. The situation will worsen with the continuation of the current development policies which will result in the decrease of the number of the population served," – ADA (2010, p.20).*

Some of the public services that have been affected as a result of rapid urbanisation rate include sewerage services, water supply, rainwater drainage, health and housing. This is notwithstanding the fact that the government has made strides towards improving the provision of certain services, including health and education. For example, King Saud's efforts at improving education provision have seen an increase in the number of enrolment rates for females. Nonetheless, these efforts have been drowned by the increasing population rate as exhibited in the case of the increasing demand for water by Riyadh residents.

Closely related to inconsistent government responsibility is the lack of expertise of municipality officials in handling urban planning. ADA (2010) acknowledges the effects that a lack of qualified human resources has on its urban planning activities.

> *"The insufficiency of the general, qualified human resources for dealing with urban development issues," – ADA (2010, p.29).*

Similarly, UNHABITAT (n.d.) decries the fact that most urban planning officials in Riyadh and other major cities are not knowledgeable on the modern technologies for urban planning, such as the Geographic Information Systems (GIS). This is attributable to poor coordination between the urban planning agencies and academic institutions, which could provide refresher courses to these urban planning officials to equip them with skills to improve on urban planning.

- Urban sprawl

Another effect of rapid urbanisation on desert and arid land is increased urban sprawl. ADA (2010) concedes that the urban sprawl will continue as the population increases.

> *"The urban growth will continue with the same pace as it has done in the recent past and will spread in all direction without a clear pattern of functional preferences"- ADA (2010, p.10).*

In this regard, one of the factors to blame for the urban sprawl is the poor land use precipitated by the poor land policies formulated by the central government. Bidgood et al. (2017) study examines and highlights the pitfalls of the land management system in Riyadh and how it has contributed to the urban sprawl in the city. Commissioned by the World Bank, the study then provides

recommendations on how to improve land management for sustainable development. Land use in Riyadh is characterised by high consumption norms whereas the city's boundaries have continued to expand as the government has been unsuccessful in containing development within the original boundaries (Bidgood et al. 2017). Additionally, there is a lack of coordination between the subdivision approvals and the urban boundaries or infrastructure. Bidgood et al. (2017) further identify various factors that impact increasing urban sprawl. One of these is the land-rules that favour low density and fragmented spatial development in the city. Furthermore, the government undertakes projects at various locations without considering the entire cost of the infrastructure, including water and other hidden subsidies (Bidgood et al. 2017). Landholders also prefer to hold on to vacant land without necessarily having to develop them; some of these lands are in central locations.

3.2.2.5. Challenges in Planning for Sustainable Urbanisation

- *Outdated policies*

The literatures identify outdated policies as a big impediment in sustainable urban planning. These policies have further created uncertainty about the roles and responsibilities of the urban planning officials, which complicates the provision of essential services to Riyadh residents. UNHABITAT (2016) for instance, mentions the development of parks as one area that has been lacklustre because of outdated urban planning policies that do not capture the need for these parks.

> *"The responsibility of development of parks was not specified clearly, and whether it shall be made by the developer or the AMANAH, which sometimes lead to leave the lands allocated for parks as white lands, which makes these lands subject to infringement" – UNHABITAT (2016, p.48).*

In another study, UNHABITAT (n.d.) points out that there is minimal cooperation between the various urban planning agencies and officials. Consequently, these agencies come up with differing strategic objectives related to urbanisation and yet the target of these objectives is one. These policies are not only outdated but also disconnected from the reality on the ground, which makes them inapplicable and unhelpful to the needs of the residents. UNHABITAT (2016) expands on this argument.

> *"The regulations and bylaws are not conforming, which will lead sometimes to certain negatives in terms of connectivity with the city at the level of districts and the neighbourhoods", - UNHABITAT (2016, p.51).*

Bajaber (2017) attributes this disconnect to poor communication between the policymakers and Riyadh residents. Most of the policy formulation processes do not adopt participatory governance;

rather they are confined to the upper echelons of the government. From there, they are then passed down to the municipalities for implementation without clear guidelines.

- High cost of living

The documents analysed also mentioned the high cost of living as a challenge in sustainable urban planning. According to these documents, in general, there is a connection between unemployment, the high cost of living as well as the use of unsustainable practices. For example, UNDP (2012) notes that the high cost of living has forced a number of people into using unsustainable energy sources, such as kerosene.

> *"Affordability is another barrier, due to high connection fees and tariffs. This can lead to continued use of unsustainable energy sources such as kerosene for lighting or solid fuels for cooking and heating" – UNDP (2012).*

The use of unsustainable energy sources has been buoyed by the availability of a lot of oil considering that Saudi Arabia is one of the world's largest producers of oil. Many people may still be apprehensive about the affordability of sustainable energy sources, such as solar panels and thus may shy away from them. However, GAMEP (2017) attributes this low uptake of the renewable energy sources to lack of public awareness on their importance and benefits.

Migrants, especially female migrants, have been one of the most affected segments of the population by the high cost of living. They have been attracted to the alleged availability of job opportunities in the cities where they arrive only to wallow in more poverty as a result of unemployment. ADA (2010) takes note of the how unemployment may be the precursor for other problems related to living conditions.

> *"Unemployment rate will go up leading to deterioration of living conditions of the population…" – ADA (2010, p.7).*

The concerns about the spiralling rate of unemployment is not something new considering that it has been raised in other fora including research papers. In his article, Al-Khateeb (2015) notes that the millions of unemployed youth in Saudi are growing frustrated at the lack of job opportunities, which may push them into criminal activities. The high cost of living has also been manifested when it comes to housing where there have been complaints about the shortfall of affordable housing. Even though JLL (2017) reveals that there has been an increase in the number of villas constructed in Riyadh in recent times, the prices of these villas may not be affordable to a substantial number of residents, especially migrants from rural areas who are trying to eke out a living. The result has been that these people have opted for informal settlements that do not contain the basic necessities like water and sanitation. Even in these informal settlements, they have to

contend with high cost of living especially considering that the demand for water services in the city continues to increase. According to Choguill (2008) in 1980-1999, the average daily water consumption per person had increased from 120 litres to 315 litres. By 2010, the water demand-supply deficit had peaked at 11.5 billion m^3 (Ouda et al. 2017). This situation has put pressure on the local government to provide water and sanitation services despite the fact that KSA is a desert country that relies a lot on groundwater for water supply.

3.2.2.6. Integration of sustainable urbanisation into future development

- *Sustainable urban practices*

The best way to integrate sustainable urbanisation into future development is through sustainable urban practices. These sustainable urban practices can be categorised as environmental, sustainable building, energy efficiency, water management and waste management. HOK (2013) advocates the need for walking as a means of conserving energy.

> *"Walking is especially important to encourage as a means of addressing the obesity challenges within the kingdom. In order to promote walkability (during the appropriate times of year and times of day) it is important to provide a comfortable microclimate," – HOK (2013).*

The poor adoption of a walking culture in Riyadh is inversely proportional to the use of private cars by residents. Affordability of cars, availability of fuel and the climatic conditions have favoured the uptake of private cars by residents in contrast to adopting a walkability culture. Furthermore, the government seems to accord less priority to developing a walkability culture by concentrating on the development of road networks instead of more sidewalks to encourage walkability. However, prioritisation of road transport using private cars has increased the rate of air pollution. HOK (2013) reiterates on the need to reduce the dependence on cars as a means of saving energy and reducing carbon emissions.

> *"Saudi Arabian cities, like many around the world, are facing a rapid increase in the demand for transport energy. Although improvements in vehicle efficiency can moderate the growth in energy demand, Vehicle Kilometres Travelled (VKT) per capita is growing and VKT reductions will be essential in the long run to achieve sustainable energy goals" – HOK (2013).*

HOK's study is a component of the Saudi Energy Efficiency Program (SEEP) commissioned by Saudi Aramco. HOK's study is geared at formulating policy guidelines and recommendations for sustainable development in the kingdom that are undertaken by Saudi Aramco and other development partners. Consequently, as part of their sustainable urbanisation development

framework, Alqahtany et al. (2014) propose energy efficient means of transport in place of the use of private cars that consume fossil fuels. This proposal is part of a consensus-based framework developed by the three authors as this was one of the main objectives of their research. The study first examines the significance of urban planning using Riyadh as a case study and comprehensively reviews the historical urbanisation of the city with particular attention paid to the strategies and policies adopted by urban planners in the course of this urbanisation process. Other quarters emphasise on the need for energy efficient methods in sustainable housing. Official documents that pay attention to this issue stress on the need to employ sustainable building materials in the erection of housing facilities. HOK (2013) for example, points out the cost effectiveness of energy efficient methods.

> *"Upgrading the energy efficiency of residential buildings is very cost effective. A recent study estimated that upgrading the energy efficiency of a typical new home to compy with the model energy code in Nevada would cost $1,500US on average but would result in about $400US in annual energy bill savings, meaning a simple payback of less than four years" – HOK (2013).*

Al-Surf et al. (2013) point out that various positive efforts have been undertaken in the Saudi construction industry insofar as the application of sustainable urban practices. The formation of the Saudi Green Building Council has boosted efforts geared towards inculcating the green building practice in the construction industry. In a bid to enable developers adopt green building requirements, the council has been at the forefront in providing training and education, advocating for the manufacture of environmentally-friendly building materials, adopting green building rating systems and increasing public awareness on the importance of green building practices.

- Sustainable urbanisation framework

Most of the documents analysed spoke of the need for a sustainable urbanisation framework to guide the integration of sustainable urbanisation practices into future development. One of the components of this framework as highlighted in the official documents is better coordination between the different levels of governance. Renaud (2016), for instance, notes that this coordination should be extended to budgeting processes and instruments.

> *"Enhance linkages and coherence across and between national and local planning and budgeting instruments and processes" – Renaud (2016, p.22).*

UNHABITAT (n.d.) points out the need to involve all urban planning stakeholders in the urban planning processes to ensure that all needs are catered for. These stakeholders should include the public who will be the most affected by the implementation of urban planning legislations. It is

important that urban planning agencies coordinate with each other to ensure that they share the same vision and strategic objectives insofar as sustainable urbanisation is concerned. Renaud (2016) notes that the private sector is an equally important partner or stakeholder that requires a conducive environment to participate in the process.

> *"Creation of an enabling environment for sustainable and inclusive business and philanthropy including informing national and urban economic development policies and plans" – Renaud (2016, p.20).*

Al-Surf et al. (2013) seem to agree with the aforementioned sentiment when they cite the housing sector as one area in which the public-private sector partnership can reap dividends. The two provide the example of Turkey and Morocco where such a partnership has allowed the government to provide many people with affordable housing. Under this arrangement, the government provides private developers with free land on which they can build these affordable homes where the latter do not have to factor the cost of buying land in the rents (Al-Surf et al. 2014).

3.2.3 Conclusion

The following key points have emerged from the analysis of the literature insofar as sustainable urbanisation in Riyadh is concerned:

- Environmental degradation remains a huge challenge and barrier to sustainable urbanisation;
- Urban planning agencies need to improve on coordination and cooperation among them in urban planning;
- The rapid population growth rate due to migration and high fertility rates will continue to impact sustainable urbanisation;
- Urban planning officials do not have enough expertise to undertake sustainable urbanisation;
- Saudi Arabia has enough financial resources to implement sustainable urbanisation projects; and
- Lack of public awareness and involvement in sustainable urban planning will affect the success or failure of sustainable urbanisation. The planning system in Riyadh and KSA in general – as depicted in figure 23 – means that public participation in urban planning and development is minimal. Therefore, the resultant policies and legislation on urban development do not cater to the needs of the city residents.

CHAPTER 4: RESEARCH METHODOLOGY

4.1. Introduction

This section highlights the research methodology adopted in data collection and analysis. It outlines the research approaches and paradigms that laid the foundation for the development of data collection tools and analysis. Equally important to highlight is the exploratory study that was conducted to gain further insight into the research topic. This chapter also outlines the method used to develop test and validate the framework in addition to the ethical approval process.

4.2. Methodology

The research adopts a qualitative approach, because unlike the quantitative approach, the qualitative inquiry provides a means of research that describes a concept based on the perspective of informants, uncovers multiple realities and establishes holistic comprehension of the research within specific contexts. The proper use of qualitative data as acquired from face to face interviews, document analysis, and field observations can help the researcher gain a better understanding of the problem, as compared to simply analysing the data on a large scale. Using this approach, this research will be able to distinguish the skills, attitudes and knowledge pertaining to the phenomenon under study (AlYahmad & Saleh, 2013). The purpose of this methodology (indicated in Figure 4-1) is to create a framework that will inform the development of a sustainable community. This will be done through the development of sustainable urbanisation processes and strategies that will not only guide, but also be guided by a triangle of stakeholders – users, actors and the government.

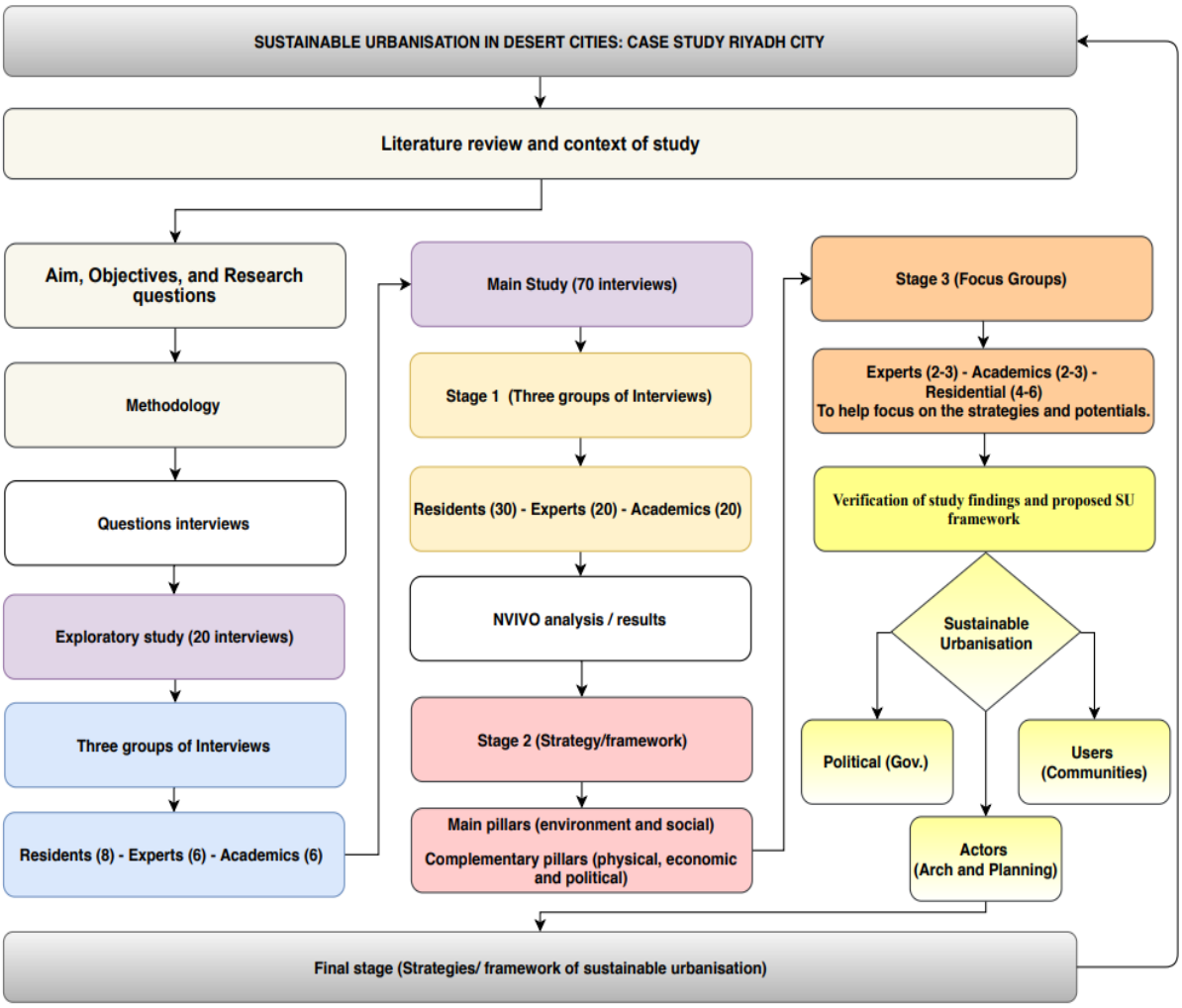


Figure 4-1: Methodological Framework

4.2.1. Methodological approach

The methodological approach adopted by the study was a qualitative one, which entailed the use of a qualitative inquiry to describe a concept based on the perspective of the respondents. According to Boslaugh (2007), a qualitative inquiry is helpful in providing answers to a question through the use of predefined set of procedures. In the case of this study, the qualitative approach was to aid in answering the research questions regarding the place of sustainable urbanisation in Riyadh. Another rationale for employing a qualitative methodological approach for this study is its ability to enable the researchers understand the research topic from the perspective of the local population or respondents. In this instance, the respondents included Riyadh residents, academics and government experts. Boslaugh (2007) notes that qualitative research is particularly effective at providing culturally specific data about the values, opinions, social contexts and behaviours of the population involved in the study. As will be evidenced through the findings of this study, there

are religious, social, historical and cultural contexts – in this case the Islamic and Arabic culture – that impact the perceptions of the respondents towards sustainable urbanisation and urban planning in general.

Qualitative methodology was further used in this research because it provides thematic analysis of the respondents' experiences on a research issue. For example, it would have been helpful in enhancing the researchers' understanding of the experiences of experts in urban planning as well as those of the residents insofar as the different issues related to urbanisation in Riyadh are concerned, such as urban sprawl, lack of affordable housing, poor waste disposal, water scarcity and environmental pollution, among others.

4.2.2. Interpretivist approach

The adoption of a qualitative approach was motivated by the interpretivism research paradigm. As opposed to positivism, this paradigm holds that the world is socially constructed and thus can only be analysed through subjective forms of measurement (Willis 2007). On the other hand, positivism holds that the social world is external to the observer who can only measure its attributes objectively (Soiferman 2010). Concerning the research topic for this study, various people have varying opinions on how sustainable urbanisation in Riyadh can be facilitated (or not) depending on these people's varying experiences, religion and culture. Thus, it is essential to adopt the interpretivist research paradigm that will allow the researcher to capture this wide range of perspectives insofar as facilitating sustainable urbanisation in Riyadh is concerned.

4.2.3. Inductive approach

Furthermore, the researcher adopted an inductive approach in the formulation of the research questions as well as the resultant research process. An inductive approach or reasoning begins with observations and concludes with a theory based on the patterns identified during the observations or collection of data (Thomas 2006). In the case of this research, the researcher is able to identify a pattern through interviews with different stakeholders in urban planning in Riyadh, including residents, government experts and academics. From this pattern, the researcher is able to draw a conclusion on sustainable urbanisation in Riyadh as far as the research questions for the study are concerned. This pattern arises from the similarity or differences in the sentiments of the three categories of respondents; for example, (in response to the first research question) it could occur that academics, government experts and Riyadh residents perceive environmental degradation as one of the barriers of sustainable urbanisation in the city. Having identified a pattern in these sentiments, the researcher might conclude that environmental degradation is a key barrier to sustainable urbanisation and consequently needs to be tackled by local governments and national government to enable sustainable urbanisation. Also known as the bottom-up approach, the

inductive approach is commonly used in qualitative research where the reasoning is characterised by subjectivity whereas the type of questions is often open-ended (Creswell 1998). As is the case with this study, the questions administered to the respondents were mostly open-ended in both the exploratory and main study. Furthermore, inductive approach is accompanied by a comparative analysis. This is the same case for this research (as shown in Chapter 7) where the researcher analyses the findings of the interviews with the three categories of respondents.

4.2.4. Phenomenological approach

Also influential in the choice of a qualitative methodology was a phenomenological approach. A phenomenology research seeks to understand how human beings or respondents experience a certain phenomenon (Lester 1999). Within the context of this study, the adoption of a phenomenological approach enables the researcher to understand respondents' experience with urbanisation in Riyadh. This is enabled by in-depth interviews, observations, personal reflections, diaries, drawings as well as focus group discussions that allow the researcher to explore the perceptions, understanding, feelings and perspectives of the people who have experienced a certain phenomenon of interest – in this case, urbanisation in Riyadh. Within the context of this study, exploring the perceptions, perspectives, understanding and feelings of respondents regarding urbanisation in Riyadh will provide the researcher with information to draw conclusions about sustainable urbanisation as far as the six research questions of the study are concerned. One key characteristic of a phenomenological approach is that analysis of the data seeks to formulate themes based on how respondents experience a phenomenon (Lester 1999). Noteworthy in this study is that it seeks to formulate a sustainable urbanisation framework based on the findings of the interviews conducted with the three categories of respondents. Another feature of a phenomenological approach is that it centres on the respondents' experiences with the research topic or phenomenon under study whereas the researcher's socio-cultural norms, traditions or pre-conceived notions about the phenomenon are excluded from the study. This is in an effort to avoid any biases or prejudices by the researcher, which may compromise the reliability and validity of the research findings.

4.3. Research Design

The research design was influenced by the qualitative approach. Patton and Cochran (2002) note that qualitative research objectives seek to understand a certain aspect of social life. This is the case in this study, which seeks to understand respondents' experiences with rapid urbanisation in Riyadh.

A qualitative approach is appropriate for answering research questions that begin with “why”, “what” or “how”. The research questions included the following:

4.3.1. What are the barriers and drivers of sustainable urbanisation and what are the challenges for planning for SU in Saudi Arabia in Riyadh?

In the first part of this research question, the study sought to explore the barriers that inhibit the realisation of sustainable in Riyadh. At the same time, the research question sought to identify the factors that might work in favour of sustainable urbanisation. The answer in this question lay in inquiring the differing perspectives of the Riyadh residents, government experts and academics on the barriers and drivers of sustainable urbanisation in Riyadh.

4.3.2. What are the economic, social and environmental factors affecting sustainable urbanisation (SU) in Riyadh?

The objective of this question is to identify and understand the economic, social and environmental factors that have previously contributed to rapid urbanisation in Riyadh and might consequently influence sustainable urbanisation in the city. For instance, it is noteworthy that the young population of Saudis has played a role in rapid urbanisation as many young people migrate from rural areas to look for employment in Riyadh or even study at higher institutions of learning. This is a social factor that might influence the success or failure of sustainable urbanisation in Riyadh.

4.3.3. What are the key components of a SU framework for future development of urban areas in Saudi Arabian cities?

This research question seeks to glean out information on the sustainability practices that can be incorporated into future development projects to realise healthy and sustainable communities. This question is further informed by the fact that the development characterising urbanisation in Riyadh has come at a cost for the residents as far as decreased air quality, increased demand for essential services, traffic congestion and reduced walkability, among others, is concerned.

Therefore, the following are the specific objectives of the study:

- To identify and examine the drivers and barriers to sustainable urbanisation in desert cities, such as Riyadh; and
- To identify and examine the environmental, social, political, physical and economic factors of sustainable urbanisation (SU) in Riyadh;
- To propose a sustainable urbanisation framework capable of being integrated into the future development of urban areas within Riyadh and other Saudi Arabian cities.

4.4. Data Collection Methods and Tools

4.4.1. Desktop study

The first data collection method that was employed was a desktop study, which is a secondary research process that reviews previous literature and studies on a particular research topic. In the case of this study, a desktop study was necessary to provide the researcher with a broad understanding of urbanisation in Riyadh as far as urban planning and sustainable urbanisation is concerned. A desktop study enabled the researcher to understand the current state of urbanisation in Riyadh with regards to various issues, such as urbanisation policies and regulations; impacts of rapid urbanisation; physical infrastructures; population growth rate; urban sprawl; and environmental status, among others. The information gathered from the desktop study was subsequently helpful in refining the research topic and consequently, the research objectives and questions. According to Boslaugh (2007), a desktop study helps the researcher identify grey areas or knowledge gaps that his or her study could explore. In the case of this research, the information collected through the desktop study was helpful in formulating the interview questions to be used as part of the exploratory and main interviews.

The desktop study was guided by the research questions, which provided the search terms to be used when looking for the relevant material via an Internet search. This systematic process consisted of summarising, collating and synthesising existing research on urbanisation in Riyadh. In the case of this study, the search for literature was not confined to Riyadh and Saudi Arabia but expanded to other areas that share similar cultural and geographical backgrounds, such as the Gulf nations of United Arab Emirates (UAE). According to Boslaugh (2007), another consideration of a desktop study is that the literature should be confined to studies or surveys conducted within a certain range of years. In the case of this research, the materials targeted were studies and reports published in the last five years (2013-2018). Step three of the desktop study is to identify the sources of the secondary data to be collected through the desktop study. In this study, the university library was the main site through which the various studies and reports on sustainable urbanisation were identified and collected. The researcher also visited various websites, such as government institutions (e.g. General Authority on Statistics) to obtain the latest statistics on the demographic make-up of Riyadh, population growth rate and the proportion of non-Saudis in the city. Furthermore, international agencies, such as UNDP and UNHABITAT provided important information on the challenges and impact of rapid urbanisation in Riyadh as well as the policy formulation processes to enhance sustainable urbanisation. Equally important in this regard were reports collected from the Arriyadh Metropolitan Authority and the General Authority on Meteorology and Environmental Protection (GAMEP).

After identifying and collecting the literature, the researcher analysed each of the sources in order to determine the relevance to the research topic. The analysis entailed looking at the following details in the case of each document: original purpose of the study; methodological approach; type of data collected; data analysis and the findings of the research. Understanding the original purpose of the research is especially important for the researcher considering that he or she was not part of the planning and implementation of the studies from which the secondary data was collected (Boslaugh 2007). The researcher keenly read through each of the literature and equally paying attention to the details for each of the studies and reports.

One of the key challenges of desktop study as was experienced in this study is out-of-date information. This was particularly the case when seeking the current statistics on population growth rate, demography of Riyadh, migration rates and proportion of non-Saudis, among others. Most of the information obtained was outdated and thus inefficient for gaining a true picture of the status of urbanisation in the city. Another challenge encountered was the inconsistency in the information gathered from the various secondary sources. For example, two secondary sources would convey differing information on urbanisation in Riyadh.

4.4.2. In-depth interviews

The research study employed in-depth interviews conducted with Riyadh residents, government experts and academics. Boyce and Neale (2006) describe interviews as a qualitative research technique in which researchers undertake individual interviews with a small number of respondents to gain the latter's perspective on specific ideas, programmes or research topic. In this instance, an was an apt qualitative research method for understanding the aforementioned respondents' perspectives on the issues surrounding sustainable urbanisation in Riyadh, such as challenges in urban planning, barriers and drivers, impacts of rapid urbanisation and the factors affecting sustainable urbanisation, among others. Furthermore, was a necessary qualitative technique in this study because it allowed researchers to distinguish individual perceptions about sustainable urbanisation unlike group opinions that can be sought through the use of focus group discussions.

The first step in using in-depth interviews to collect data was to plan for and identify the respondents. As will be expounded later in the subsection on data collection procedures, the respondents to be interviewed included Riyadh residents, academics and government experts of urban planning. In planning for the respondents, the researcher had to consider the type of data that would be collected from each of these categories of respondents. This consideration was necessary to guide the framing of the interview questions. The subsequent step was to develop the data collection instruments, which were the interviews to be used. As will be explained later in the

subsection on the administration of interviews, the interview questions were developed in accordance with the research questions, which were later grouped into six different themes. Also developed was an interview protocol to be followed by the researcher/student when interviewing the respondents. The interview protocol included the following details:

- Seeking oral or written informed consent from the interviewees;
- Opening remarks to the interviewees;
- Concluding remarks to the interviewees;
- Actions to undertake during the interviews (e.g. taking notes, audio recording).

4.4.3. Focus Group Discussions (Verification of study findings)

The Focus Group Discussions were conducted with select academics, government experts and Riyadh residents during the verification of the research findings as well as the proposed sustainable urbanisation framework. This is a qualitative research method in which the researcher interviews a group of people at the same time – these people share similar backgrounds or experiences. For example, in the case of this study, those interviewed as Riyadh residents shared a similar background of being inhabitants of Riyadh while government experts were people who share a similar background of working on urban planning issues. Furthermore, academics consisted of people who share a similar background of having conducted research on urbanisation in Riyadh and Saudi Arabia in general. Boyce and Neal (2006) note that the key strength of Focus Group Discussions is that they provide researchers with an opportunity to understand the range of opinions and ideas surrounding an issue. This is because the participants in Focus Group Discussions may not necessarily share the same perspectives about a research topic or – as is the case with this study – the findings of a research. Furthermore, this method provides deeper understanding of the research findings, which are usually statistically unexplainable.

In the case of this study, the participants were informed beforehand of the objectives of the meeting, which was to verify the research findings as well as the proposed sustainable urbanisation framework. Each of the participants in the respective three Focus Group Discussions was provided with a factsheet summarising the objectives of the research, the research questions, research findings and the proposed sustainable urbanisation framework. Boyce and Neal (2006) recommend that 6-8 should be the maximum number of participants. Bearing this in mind, the Focus Group Discussions conducted with Riyadh residents had the highest number of participants with six residents participating in the study. The Focus Group Discussions conducted with academics and government experts consisted of three participants in each case. This number of participants in the respective Focus Group Discussions allowed every participant an opportunity to contribute to the

discussion. Each of the sessions was overseen by the researcher who began every session by first establishing the ground rules of engagement. Participants were informed that each one of them had the right to disagree with the opinion or sentiment of others but that that had to be done in a respectful manner. Another ground rule was that every participant would be afforded the opportunity to finish explaining his point without interruptions from other participants. Additionally, mandatory during the sessions was the use of respectful language.

As is the norm with other data collection methods, participants were informed of their rights before the commencement of the session. As part of informed consent, the participants were notified by the researcher that their personal information would be kept confidential. Furthermore, they were informed that any one of them would be free to withdraw from the Focus Group Discussions session in case they felt uncomfortable and that the information they had thus far provided would not be used.

4.4.4. Administration the interview

The questionnaire contained 25 questions categorised into the six thematic areas that were harnessed from the research questions and research objectives. The questions were developed after the exploratory study during which the interview was piloted to identify any questions that might need reworking or any that should be added/deleted. During the interviews, the researcher read out the questions to the respondents who then answered. Even though the language of communication was English, the researcher translated the questions into Arabic in cases where the respondents were not fluent in English.

4.5. Sampling and Participants

In selecting the sample size and the participants in the study, the researcher adopted the purposive sampling method. Also known as subjective, selective or judgmental sampling, this sampling method solely relies on the judgment of the researcher to select the units to be studied (Sharma 2017). Depending on the study, these units may include events, pieces of data, case/organisations and people. In the case of this study, the units to be studied included people (Riyadh residents, academics and government experts). The different types of purposive sampling include total population sampling, expert sampling, maximum variation sampling, homogeneous sampling, extreme/deviant case sampling and typical case sampling.

For this study, maximum variation sampling was applied to identify the study participants. Also known as heterogeneous sampling, this form of purposive sampling aims at capturing a wide range of perspectives related to a phenomenon under study. In this study, the application of maximum variation sampling allowed the research to gain an understanding of various perspectives on

facilitating sustainable urbanisation in Riyadh. The use of this sampling method allowed the researcher to capture a wide range of perspectives from the most typical to the most unique or extreme. Because of this, the population under study exhibited a wide range of attributes, experiences, qualities and behaviours. Sharma (2017) describes this as one of the outcomes of applying maximum variation sampling. This was exhibited in the case of this study in which Riyadh residents, academics and governments each had differing characteristics including experience, behaviours, situations and perspectives insofar as urbanisation in Riyadh is concerned. Furthermore, with this sample, the researcher was able to look at sustainable urbanisation from all angles and identify common themes emerging across the samples. However, purposive sampling is not without shortcomings as was witnessed in the case of this study. One of these pitfalls is that it is prone to researcher bias unlike probability sampling (Sharma 2017). This bias emanates from the fact that the respondents for the study are often selected based on the judgement of the researcher. Furthermore, purposive sampling may not provide a sample that is representative of the general population. This means that the researcher may find it hard to prove that research attained logical or theoretical generalisation.

For the exploratory study, the sample size consisted of six government experts, six academics and eight residents drawn from the five municipalities of Riyadh (Al-Olayyah, Nemar, Al-Ma'athar, Al-Diriyah and Al-Naseem). The five sub-municipalities were selected out of the 11 sub-municipalities within the larger Riyadh municipality because of their homogeneity in population insofar as gender, socioeconomic statuses and years of residence in Riyadh is concerned. Table 4-1 provides a profile of the five sub-municipalities, including their population, size and geographical location.

Table 4-1: Profile of sub-municipalities that were the sites of study

Sub-municipality	Geographical size	Geographical location	Estimated population
Al-Diriyah	2016km2 (approximately 0.54% of the total area of Riyadh)	Located between the centre of the Arabian Peninsula. It borders the Huralia province to the north, Shoaid Expatriate to the south, King Khalid Road to the east and Darmaa province to the West	68, 456 residents
Nemar	104 km2	Borders Jeddah Road, Western Ring Road and North West Side to the North. Also borders Dirab Road to the East	Has a total of 7 neighbourhoods with estimated 500,000 residents
Al-Naseem	225 km2	Borders Khurais Road to the North; Development Borders to the East; Eastern Ring Road to West; and Prince Saad bin Abdul Rahman I Road to the South	Approximately 514,364 residents within a total of 8 neighbourhoods

Al-Ma'athar	44km2	Borders North Ring Road to the north; Mecca Road to the South; King Fahad Road to the east and King Khaled Road to the west	A total of 9 neighbourhoods with an estimated population of 221,695 residents
Al-Olayyah	123 km2	Borders Northern Ring Road to the north; Mecca Al-Mokarama Road to the south; King Fahd Road to the west and Eastern Ring Road to the east	A total of 15 neighbourhoods with an estimated population of 322,844 residents

As is the case with purposive sampling, these five municipalities were chosen to achieve a representative mix of people from different age groups and locations as well as to minimise the risk of researcher bias. Choosing the five municipalities was also helpful in increasing the reliability of the qualitative data, which would help the researcher gain a wide range of perspectives on sustainable urbanisation as far as the different municipalities in Riyadh are concerned. Riyadh residents were identified through Islamic centres in the aforementioned municipalities. This was done with the help of the imams in these centres who had already struck a rapport with the targeted respondents. On the other hand, the government experts were identified through institutional channels or local government offices. They were identified and recruited through emails and face-to-face visits requesting for their permission to participate in the exploratory study. The criterion for the inclusion of the government experts in the study was that they had to be attached to the urban planning department and thus, knowledgeable on urban planning issues affecting Riyadh. The academics were identified and approached through their respective institutions. Their inclusion was based on their expert knowledge on urbanisation issues by virtue of having conducted extensive studies on urbanisation-related issues or having been lecturers on urbanisation-related issues, such as migration, demography, natural resource management, urban planning, environmental management, architecture and economics, among others.

For the main study, the sample size was expanded to include 30 Riyadh residents, 20 experts and 20 academics. These respondents were selected through snowball sampling where the respondents in the exploratory study provided the researcher with referrals. Also known as chain referral sampling, snowball sampling occurs when the respondents introduce the researcher to other people or potential respondents who could contribute or would be willing to participate in the research (Penrod et al 2003). It is an effective strategy in instances where the researcher would not be able to access potential respondents using other sampling strategies. As part of purposive sampling, the main challenge of using maximum variation and snowball sampling is the risk of researcher bias considering that purposive sampling is a subjective kind of sampling. Biernacki and Waldorf (1981) note that this weakness of purposive sampling makes it hard for the researcher to argue that

the sample size is representative of the general population. As part of purposive sampling, the main challenge of using maximum variation and snowball sampling is the risk of researcher bias considering that purposive sampling is a subjective kind of sampling. Biernacki and Waldorf (1981) note that this weakness of purposive sampling makes it hard for the researcher to argue that the sample size is representative of the general population. Apart from lack of representativeness insofar as the general population is concerned, snowballing sampling has a heightened risk of sample bias because it relies on respondents to recruit other potential respondents. In such an instance, there is a high possibility that the respondents chosen by other respondents may share the same traits and characteristics or even perspectives about a research topic (Penrod et al. 2003). This was the case for this research when most of the residents recruited through snowball sampling had the same traits and characteristics.

4.6. Data Collection Procedures

4.6.1. Stage 1: Exploratory study

The first stage of the data collection process was an exploratory study that was conducted with six experts, eight Riyadh residents and six academics. These respondents were drawn from the five municipalities of Nemar, Al-Naseem, Al-Olayyah, Al-Diriyah and Al-Ma'athar. The purpose of an exploratory study is to gain further insight into a research topic or problem. As is the case with all exploratory studies, the exploratory study in this case was not meant to reach a final verdict or conclusions on the facilitation of sustainable urbanisation in Riyadh. Furthermore, exploratory research helps to provide a foundation for a conclusive research and the methodology as well as sampling strategy for the main study.

The interviewees were asked a series of open-ended questions that were prepared beforehand to gauge their perceptions, attitudes and knowledge about factors that can enhance or inhibit sustainable urbanisation in Riyadh. The use of open-ended questions proved to be a useful strategy in this study as it allowed the researcher to evaluate the respondents' true feelings on sustainable urbanisation in Riyadh. This was because the respondents were able to include extra information in their responses to the questions through their feelings, attitudes and knowledge of the research topic. Furthermore, the use of open-ended questions helped avoid the response error that is usually occasioned by the use of closed-ended questions. In the latter type of questions, respondents are often likely to disregard the questions and simply choose an answer from multiple choices; an answer that may not necessarily be a true reflection of their attitudes, feelings and knowledge of the research topic. Whereas there were no qualifications for the residents, the qualification for government experts is that they must have handled urban planning issues in Riyadh and were thus knowledgeable enough to speak on the issues affecting the realisation of sustainable urbanisation

in the city. On the other hand, the academics targeted were scholars who have conducted studies or urbanisation-related issues and were offering courses on the same. An exploratory interview with the academics as well as the government experts was geared towards enriching the study with expert information on urbanisation-related issues in Riyadh insofar as sustainable urbanisation is concerned. The information garnered from interviews with these two categories of respondents would be helpful in widening the scope of the study as far as sustainable urbanisation in Riyadh is concerned.

- *Findings of exploratory study*

The interview results were analysed using NVIVO 12 software by first organising the data documents, which included interview responses and notes of observations. The researcher formulated query data by asking respondents questions regarding the environmental, physical, political, social and economic factors of sustainable urbanisation in Riyadh. This was done to gain an understanding of the theoretical and conceptual issues related to sustainable urbanisation in the city of Riyadh. The open-ended questions – numbering 15 for all the categories of respondents – were arranged into six clusters in reference to the following urbanisation issues: social factors, physical factors, environmental factors, sustainable living, sustainable communities and political factors. As indicated in Figure 4-2, there are several overall issues identified by the three categories of respondents, which they felt was necessary to tackle in an effort to enhance sustainable urbanisation in Riyadh.

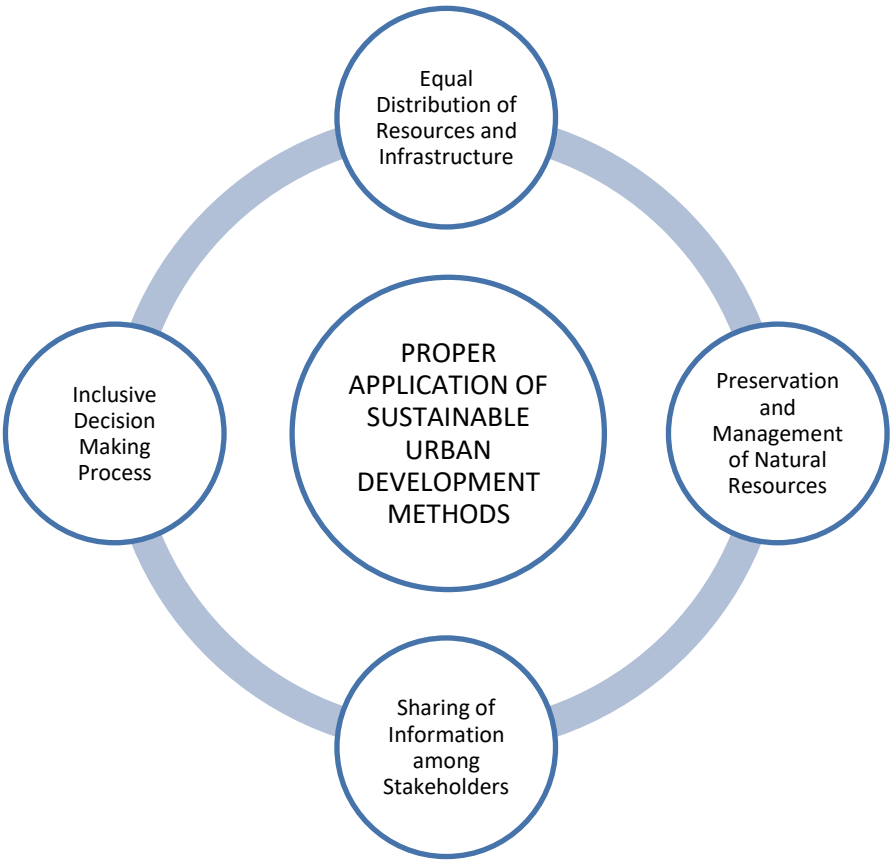


Figure 4-2: Application of sustainable urban development methods

The perception among a majority of Riyadh residents interviewed is that Riyadh has inadequate infrastructure that cannot cope with the increasing population growth in the city. Subsequently, the residents interviewed felt that the inadequate infrastructures are a prominent barrier to sustainable urbanisation because many of them do not have access to necessities, such as electricity and water. For the government experts, the overall feeling is that natural resource depletion is a huge challenge in planning for sustainable urbanisation because it has not been managed or controlled prudently by the local government. They also felt that continued in-migration to Riyadh is a major barrier to sustainable urbanisation because it will spur urban sprawl as evidenced by the continued development of houses of poor quality. Another issue identified during the exploratory interviews with the experts was the environmental degradation in the city. Consequently, they emphasised on the need for adaptive urban planning processes and strategies to tackle emerging problems; some of these strategies included improved coordination between urban planning authorities; involvement of the community in sustainable urban planning processes; and providing local governments with autonomy in urban-related decision making processes. According to the exploratory interviews with the three categories of respondents, the drivers of sustainable urbanisation revolve around five factors, including social, economic, environmental, physical and

political. This is better represented in Figure 4-3, which has been adapted largely from Allen's (2009) conceptual sustainability framework (Figure 4-4).

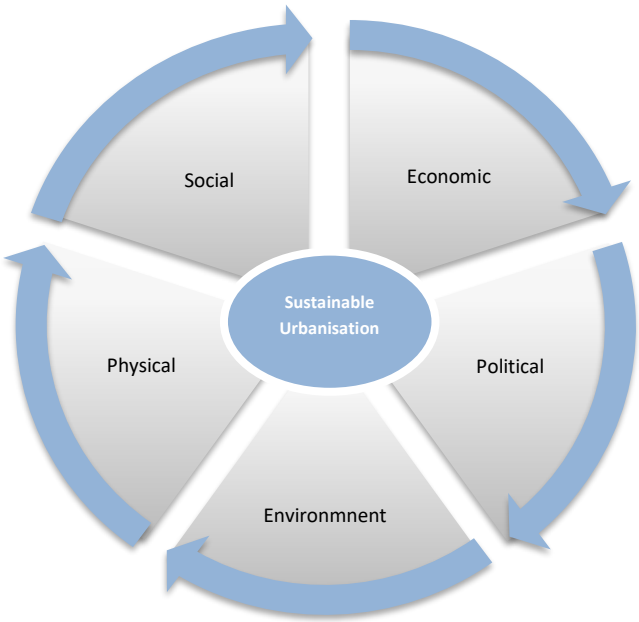


Figure 4-3: Drivers of sustainable urbanisation

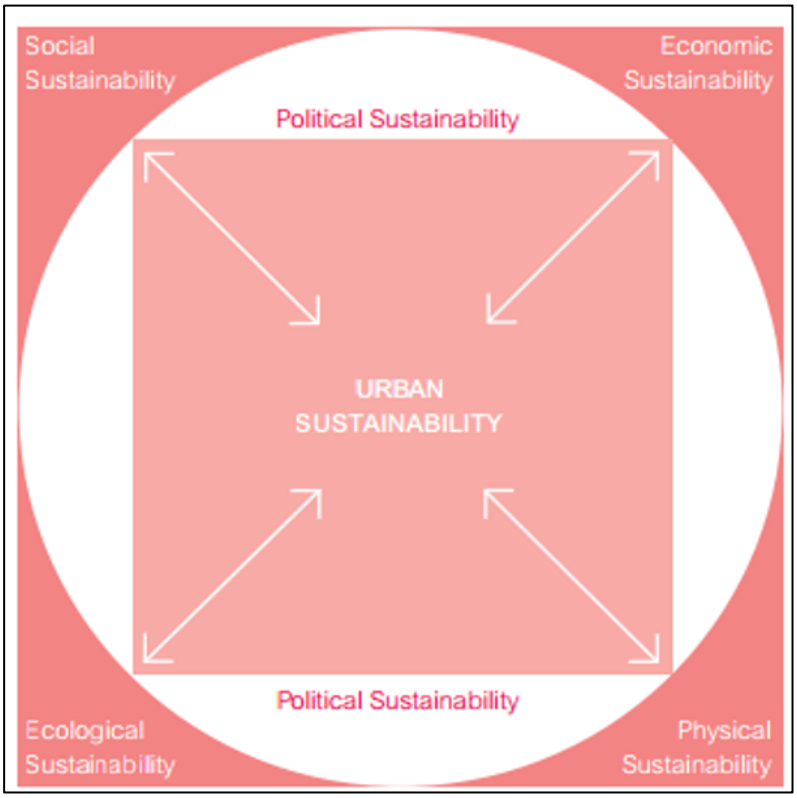


Figure 4-4: Allen (2009) dimensions of sustainable urbanisation

When broken down, the overall social and environmental factors – as discovered through the exploratory interviews with all the respondents – include agriculture, development projects, housing, transportation, resource allocation and climate. This is represented in in figures 4-5 and 4-6.

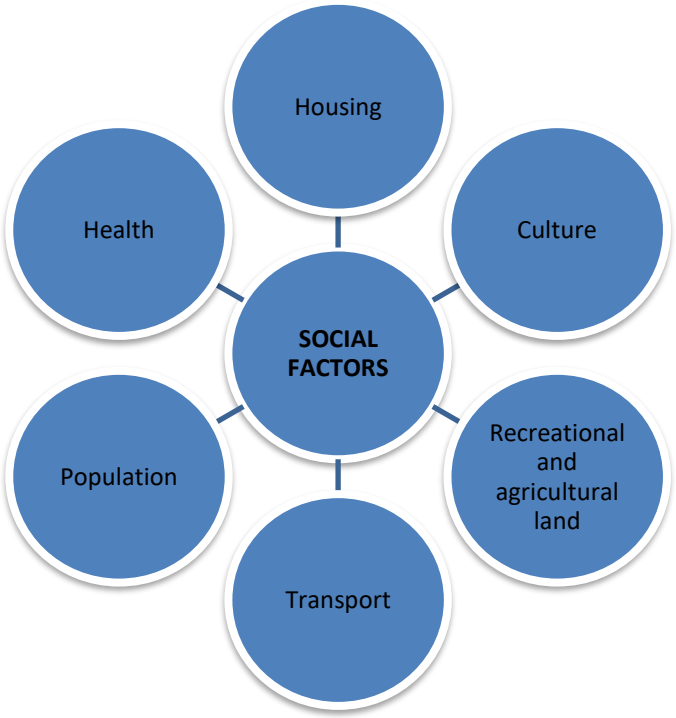


Figure 4-5: Social factors influencing sustainable urbanisation

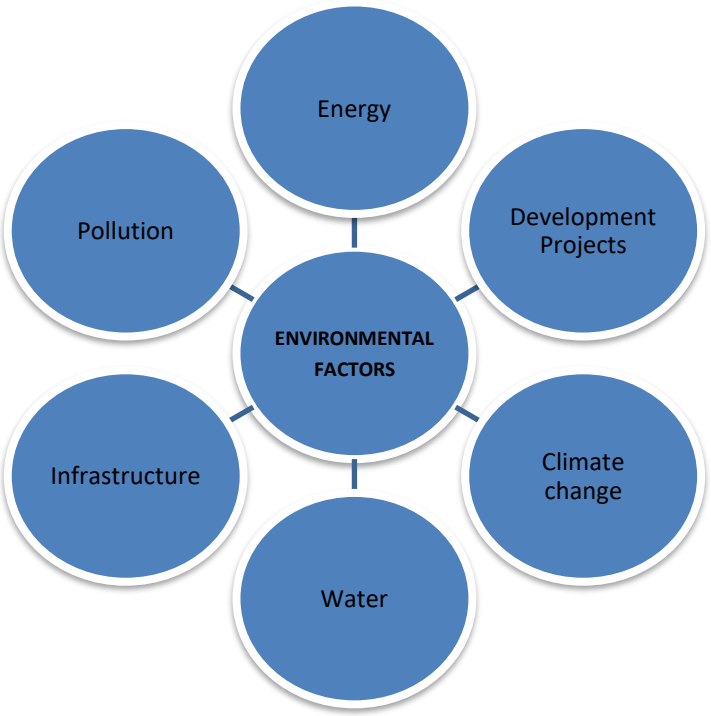


Figure 4-6: Environmental factors influencing sustainable urbanisation

Additionally, exploratory interviews with the three categories of respondents identified the following challenges that inhibit urban planning in Riyadh and KSA in general:

1. Deterioration of air quality.
2. High energy demands and consumption, as a result of the high regional economic development and population growth.
3. Lack of safe drinking water supplies because of the scarcity of fresh water.
4. Pollution caused by industrial waste.
5. Poor waste management.
6. Lack of preservation and management of natural resources for se by the future generations

Based on these challenges, the exploratory interviews brought to the fore several sustainable environmental strategies that should be incorporated into future development projects for healthy and sustainable communities. These strategies as proposed by the respondents include the following: minimization of non-renewable energy use (i.e. petroleum products), preservation of natural resources, adoption of renewable energy, modern waste disposal methods and reduced air pollution.

4.6.2. Stage 2: Main study

Using the data garnered from the exploratory study, the researcher developed a new set of questionnaires to gain a deeper understanding of the issues identified during the exploratory interviews. The main study consisted of 25 questions categorised into six different sub-themes based on the four research objectives as well as the three research questions that the researcher set out to answer. These sub-sections/themes included the following: Barriers and Drivers of Sustainable Urbanisation in Riyadh (Theme 1); Improving the Quality of Life (Theme 2); Environmental, Social and Historical Factors Affecting Sustainable Urbanisation in Riyadh (Theme 3); Challenges in Planning for Urban Planning in Riyadh (Theme 4); Impact of Rapid Urbanisation on Desert and Arid Lands (Theme 5); and Integration of Sustainable Urbanisation into Future Development Projects (Theme 6). The interviews were a mix of open-ended and closed-ended questions. In cases where questions had multiple choices, the respondents were asked a follow up question seeking to understand the reason behind their choices of answers. Furthermore, the sample for the main study increased from that of the exploratory study. The main study interviewed a total of 70 respondents divided into the following categories: Riyadh residents (30), government experts (20) and academics (20). The findings of the main study have subsequently been expounded upon in Chapter 6 (Interview Analysis).

4.6.3. Challenges encountered during the data collection

The researcher encountered numerous challenges during the data collection process in both the exploratory and main study. One of these challenges was the unwillingness of some of the respondents to participate in the study. This was mostly encountered when engaging government experts who have handled urban planning issues. Those unwilling to be interviewed in the study attributed their apprehensiveness to their fear of victimisation by their employers (the local government) for any comments that they may have made in regards to urban planning process in Riyadh. In particular, one expert pointed out that it would be counterproductive for him to paint the government in bad light by highlighting the policy and administrative weaknesses that have hindered the facilitation of sustainable urbanisation in the city. Nonetheless, this challenge was countered through the use of informed consent; the researcher assured all the respondents that their identities would remain anonymous. Furthermore, they were enlightened on how the data gathered from them would be kept and who would be able to access the data. Among Riyadh residents were some who were hesitant to be interviewed because they felt that their opinions or perceptions on urbanisation would not yield much fruit as far as improved service delivery is concerned. However, the researcher assuaged their fears by explaining how their comments would be an integral part of empirical evidence for facilitating sustainable urbanisation in Riyadh and KSA in general. In addition, the researcher reiterated to the would-be respondents that their participation in the study was wholly voluntary.

In certain instances, language barrier was a problem as certain respondents – mostly Riyadh residents – could not comprehend the questions, which were written in English. Therefore, they had challenges in providing accurate answers to the questions. This situation necessitated the oral translation of these questions into Arabic by the researcher. The researcher read out the question to the respondent in Arabic to which the latter would answer in Arabic.

4.7. Data Transcription and Analysis

4.7.1. Data transcription

The interviewing process was followed by transcribing of the data into written form in Microsoft Word. This process entailed listening to the audio recording of the interviews and writing down the responses of each of the respondents to the interview questions. Furthermore, the transcribing was based on the field notes that the researcher had taken during the interviews with the respondents. Field notes were occasioned by the fact that certain respondents were uncomfortable with being recorded with audio devices for fear of their confidentiality being compromised. Each of the transcripts contained the following information: name of the study; pseudonyms of the

respondents; date and time of the interview; category of respondent (i.e. resident, government expert or academic); and duration of the interview.

Transcribing of the interviews was done verbatim by noting down the exact words of the respondents as recorded by the audio devices. This entailed writing down the responses of the respondents regardless of the grammatical errors. In cases where the researcher could only rely on the field notes, the transcribing was done immediately after the interview while the information was still fresh in the mind of the interviewer.

4.7.2. Data analysis

The qualitative analysis of the data was conducted using Nvivo 12, which is the latest version of Nvivo software. This software has proven effective in evaluating, interpreting and detailing social phenomena. QSR International (2018) notes that Nvivo is suited for analysing semi-structured and unstructured data, including surveys, interviews, field notes, journal articles, audio data, web pages and video formats among others. After transcription of the data into Microsoft word, the transcripts were saved into different files named according to the three categories of respondents interviewed for the study: Riyadh residents (R); Experts (E); Academics (A); and official documents (OD). These files were then imported to Nvivo at various intervals starting with the file on Riyadh residents. In each of the categories of respondents, the interview responses were categorised according to the six themes of the research, which were developed from the research questions. Thus, in addition to a file containing the interview questions and responses, there was a file for each category of respondents focusing on the respondents' introductory remarks to each of the six themes. These files were named Main Themes.

Particularly important to the analysis of the data was the auto coding of the transcripts. Before importing the transcripts and files onto Nvivo, each of the survey questions was edited in Heading 1 style on Microsoft Word whereas the respondents' responses were left in the Normal style. The auto coding process began with the creation of six nodes representing the six main themes in the survey. To enable each node code with its specific survey responses, the box marked "Aggregate coding for Child Nodes" was checked. This enabled the researcher to align each node with its respective survey responses from all the respondents. For instance, interviewees' responses on Theme 1 (Barriers and Drivers of Sustainable Urbanisation) were all classified under the Node named Barriers and Drivers of Sustainable Urbanisation.

By reading through the responses for all the interviewees, the researcher was able to identify certain issues or sub-themes that were prominent in the responses. This prompted the researcher to code at existing nodes by right clicking on existing nodes – also known as parent nodes – and creating a new node or sub-theme (also known as child nodes). Furthermore, the data analysis

process was a manual one during which the researcher read through the survey responses and manually related to their respective nodes. This was accomplished by manually highlighting the relevant texts, dragging and dropping them into their respective child nodes. After the manual coding of the texts in the survey responses to the relevant themes, the researcher used the nodes and child nodes for the six themes to create frequency charts.

4.8. Verification of the study findings

4.8.1. Establishing reliability and validity

Reliability and validity are important in qualitative research considering that this type of research is hinged upon contextual, interpretive and subjective data. Reliability is the consistency or likelihood that the study will replicate its findings when they are repeated. On the other hand, validity refers to the correctness or the accuracy of study findings. Closely related to validity is credibility, which is also known as internal validity; it refers to the trustworthiness and believability of the study findings depending on the quality of the data gathered (Leung 2015). Subsequently, the internal validity of the findings can only be ascertained by the respondents in the study. This explains why the verification was conducted in this study by taking participants through Focus Group Discussions during which they discussed the study findings and the proposed sustainable urbanisation framework. On the other end of the spectrum is the aspect of transferability, which is the external validity of qualitative study findings. A study is considered to have met the threshold of transferability if its findings can be applicable to other contexts by readers of the research report, including similar settings, situations and populations, among others (Leung 2015). Within the context of this study, it fulfils the threshold of transferability based on the fact that the researcher expounds on the context of the research to enable the readers generalise the findings and apply them as expected.

Regarding reliability, a study that meets the threshold of reliability legitimises the methodology adopted for data collection. This is because the research is likely to provide the same findings when repeated using the same methodology. Considering that qualitative research is often characterised by changes in the research settings and contexts, it is important for the researcher to outline any aspect of changes or unforeseen occurrences to expound on the findings (Leung 2015). Such information is important for other researchers who may wish to replicate the research. In the case of this study – as shall be seen in subsequent chapters on interview analysis – the researcher notes the likelihood that Saudi Arabia may divert from the dependence on oil as a source of energy. This may present a different research context from the one in which this study was conducted during which Riyadh city and the whole of KSA has been dependent on oil as a source of fuel for automobiles, which has consequently decreased the air quality.

Another important aspect of reliability and validity in qualitative research is confirmability. It is a measure of objectivity that is exhibited by the extent to which the research findings and conclusions are founded on actual data (Leung 2015). This aspect is often evaluated by other researchers who are supposed to ascertain whether the research findings are informed by actual data and not the subjective perspective of the researcher. In the context of this study, the Focus Group Discussions conducted with the academics helped ascertain the confirmability of the study findings during which they queried various aspects of the study, including the methodological approach, sources of secondary data, the research findings and elements of the proposed sustainable urbanisation framework.

4.8.2. Verification exercise by Riyadh residents

The validation of the research findings and the proposed sustainable urbanisation framework was first conducted with Riyadh residents via Focus Group Discussions. Six residents who had participated in the main study were contacted and invited through email for a verification meeting during which they were to air out their suggestions, questions and reservations regarding the preliminary findings as well as the proposed framework. Beforehand, each of them was emailed a factsheet containing a summary of the research findings and the framework. The Focus Group Discussions took approximately one and a half hours during which the researcher presented the framework and moderated the discussions of the study findings and the framework. Assisting the researcher/moderator was a note taker who recorded the sentiments of the participants and also helped in the arrangement of the venue.

4.8.3. Verification exercise by academics/researchers

Three academics who had participated in the main study were invited for the verification of the study findings and sustainable urbanisation framework. As was the case with the other respondents, each of the academics was provided with a factsheet containing a summary of the study findings and the proposed sustainable urbanisation framework. During the Focus Group Discussions, each one of them was encouraged to provide his insights into the findings as well as providing suggestions on how to improve the proposed sustainable urbanisation framework.

4.8.4. Verification exercise by urban planning/government experts

Similarly, Focus Group Discussions were conducted with government experts to verify the study findings and the sustainable urbanisation framework. A total of three government experts out of the 20 who had participated in the main study were invited to participate in the Focus Group Discussions. Beforehand, each one of them had been provided with a copy of a factsheet containing the summarised study findings and sustainable urbanisation framework. The experts were then

able to provide their suggestions to improve the study findings in addition to interrogating various aspects of the research.

4.9. Strategy framework development

This research intends to explore, explain and describe the construction of a sustainable situation, as well as establishing sustainable development principles for both Riyadh and Saudi Arabia in general. The purpose of this methodology is to develop a framework that will inform the development of a sustainable community. This will be done through the development of sustainable urbanisation processes and strategies that will not only guide but also be guided by a triangle of stakeholders – users, actors and the government.

Initial developments of the strategy framework entailed the use of detailed literature review from research papers and studies conducted over the last 20 years. The interview results were used to establish the key components and variables that formed the basis of the entire research.

The framework for development of this research study is based on the community's main interconnected objectives, that is, economic advancement, social integration, environmental sustainability, and good governance and security. As such, it will involve three main stakeholders, these are, residents, urban planning experts, and members of the local government. However, each of these four dimensions of sustainable urbanisation contributes towards the three stakeholders, all of which are crucial in ensuring both individual and societal well-being. Sustainable urbanisation has therefore been established on the first five factors: economic, social, environmental, physical, political, and health (as a forecast). The issues of good governance and personal security have been brought up to emphasize several enabling conditions for sustainable living and conditions, including transparency, the rule of law, effective urban services, participation, accountability, and adequate budgeting and financing of impending projects. In doing so, this framework will be highly effective in analysing sustainable development by focusing on key challenges, recognizing the gaps, and committing to any actions that are relevant in delivering and mainstreaming sustainable urbanisation in Riyadh.

Indicators

The aim of this framework is to inform the integration of sustainable urbanisation into crucial areas of policy and strategies that will effectively put in place the implementation of mechanisms that will eventually deliver concrete measures in the progress of sustainable urbanisation. Indicators of the framework therefore include:

- The increased identification and prioritisation of policy areas and strategies in which a sustainable urbanisation approach will add value, and facilitate progress towards new strategy aims
- Overall highlighting and promotion of existing sustainable practices that will support, correct, supervise and underpin sustainable urbanisation in general
- Increased policy integration, coordination, coherence and incorporation of a long-term perspective in decision making processes
- The setting out of government mechanisms in ensuring proper participation within the government and across all stakeholders
- Increased corporation of effective and adequate monitoring, improvement and learning in the framework process
- The setting out of concise measures, duties and timelines in implementation plans

Verification of framework

Within the city, while many urban services are progressing, others are less so, especially because of the lack of an overarching agenda to integrate sustainable urbanisation considerations into economic and social decisions. Sustained efforts will be made to encourage the three stakeholders to continue participating and integrating sustainable development considerations. Testing efforts have therefore been categorized into the following categories:

- Feedback acquired from education projects on behaviour change and communication
- Monitoring and evaluation results from relevant skills and training programs that are structured for the stakeholders
- Analysing policy changes with regard to global sustainable and poverty development

Political Share with Other Stakeholders

The political division of sustainable development, through viable stakeholder engagement strategies, will collaborate closely with other residents to form a coordinating unit of facilitators. They will therefore act as organizing partners. They will also comprise of accredited individuals from other individuals in the country to act as facilitators between the local stakeholders, and other cities. These partners will perform the following tasks:

- Coordinating inputs.
- Reforming communication.

4.9.1. Creating Sustainable Urbanisation with Sustainable and Liveable Community

The table below summarises the participant's perspective on the current levels of sustainable urbanisation in Riyadh. The results of this analysis drew attention the fact that the city's management, planning, and governance arrangements are mostly failings. The graphs produced as based on the keywords and wordings of the interview responses, all show that the land use and infrastructure plans lacked comprehensiveness, did not properly consider the array of environmental, social and economic issues affecting the residents of Riyadh, and were prepared with limited involvement of some of the stakeholders. The residents have displayed great interest in being involved in the sustainability process at local levels, and are prepared to participate at a project-by-project basis with the supervision of the local government, and not as part of the subsequent adaptive process of the city's plans for development.

4.9.2. Stakeholders and their Contribution to this Research

According to the findings of this research, the urban planning practices and governance arrangements are largely to blame for the poor living environment in Riyadh. Despite the huge amount of effort that the local government has invested in the development of the city over the last 50 years, there is still a great shortage of urban services, infrastructure, and residential housing. The issue of poor urban governance in Riyadh has been linked to the ineffectiveness of the development and urban planning process. It is therefore argued that improved governance and arrangements would contribute to the development and urban planning process, and eventually the outcomes.

The policy and urban planning frameworks are made of stakeholders that are in charge of establishment and operation of the planning systems. There are three major perspectives when it comes to analysing the role of stakeholders in the process of sustainable urbanisation that is, procedural planning, focus on urban planning, and routeing operation of the management systems. It is, therefore, the duty of the stakeholders to properly develop the planning process, establish how best to practice these strategies, and refrain from the adoption of theories and design disciplines that are not applicable within their locale. This is mainly because developing an idealised planning process would be highly responsive in the evolution of Riyadh's external environment in which planners work, and residents can participate.

4.10. Ethical Considerations

4.10.1. Obtaining approval of school ethical committee

Before commencing the research, the researcher undertook an ethics application from the university's ethics committee. The purpose of the application was to show that research meets the

guidelines of the research ethics policy developed by the University Research Ethics Committee (UREC). As per the guidelines, the research proposal was first submitted to supervision for review to ensure that the methodological approach and objectives of the research are sound and appropriate. In the application, the researcher had to provide information on the objectives of the study and its methodology. Furthermore, the research application provided information on the personal safety of the applicants and modalities for maintaining data confidentiality. Submitted alongside the research application were written copies of an informed consent as well as an information sheet specifying the research objectives. Furthermore, the information sheet contained the following details: name, physical address and email contacts of the lead researcher as well as the date of submission. These documents were submitted to UREC, which is responsible for approving all research projects. Afterwards, the UREC approved the research having satisfied the ethical requirements.

4.10.2. Adherence to qualitative research ethics

The data collection and analysis process was conducted in accordance with qualitative research ethics that deal mainly with the interaction between the researchers and the respondents. Before conducting the research, the researcher familiarised himself with the following aspects of UREC research ethics policy: safety and well-being; integrity, openness and honesty. Integrity is an important ingredient in research to enhance the trustworthiness of the study whereas openness ensures credibility of the study (Dorch 2015). Safety and well-being requires that the researcher should minimise the psychological and social risks that might occur to respondents by virtue of participating in the study. According to Nijhawan et al. (2013), respect for persons demands that researchers should maintain the autonomy of the respondents by respecting their right not to participate in the study. On the other hand, justice means that the researcher should ensure that research participants enjoy the benefits of the knowledge garnered from the research. Equally important as part of research ethics is respect for communities; in this regard, the researcher must respect the cultural values and interests of the communities as well as the individuals participating in the study. In the case of this study, the researcher had to be cognisant of the fact that the respondents ascribe to the Islamic culture and thus, this background would determine their attitudes, behaviours and thoughts.

Key to meeting the ethical guidelines of qualitative research were informed consent procedures. These procedures were prepared in the form of written document, which contained the following details: purpose of the research; what is expected of the respondents (i.e. estimated time of participation in the research); anticipated risks and benefits (psychological and social); the rights of the respondents to withdraw from the research at any time without repercussions; procedures to

ensure confidentiality; name and contact of lead researcher; and how the data gathered from the respondents will be used. Apart from a written informed consent, the researcher provided each respondent with a detailed explanation of their rights before commencing the interviewing process. The participants were informed that they had the freedom to withdraw from the research at any point without any repercussions. Furthermore, the researcher informed them about the plausible risks of their participation in the study and the subsequent steps that the researcher had undertaken to minimise these risks. Except for government experts and academics, the language used to seek informed consent from Riyadh residents was Arabic. The use of Arabic language was to cater for the respondents who may not be able to communicate and understand English. Without seeking their informed consent in a language in which they were versed, such respondents would have been participating in the research without full knowledge of what it entails to participate in the study. In the case of government experts and academics, English was used to seek their consent to participate in the study. According to Nijhawan et al. (2013), information provided in an informed consent should be in an understandable language that is commensurate to the educational level of the participants. Considering that the research had minimal risks, oral consent was sought in most of the interviews in which case the respondents did not have to sign an informed consent form.

4.11. Conclusion

Qualitative methodology is an appropriate approach for answering the research questions of this study. The elements of the qualitative methodology, which the researcher adopted in data collection, include the interpretivism, inductive and phenomenological approaches. Collectively, these approaches are effective in qualitative research as they allow the researcher to explore and understand respondents' experience with the research topic through their attitudes, feelings and knowledge. This was the case with this research during which the researcher is able to understand respondents' experience with urbanisation-related issues in Riyadh. To understand these experiences, data was collected using in-depth interview and later tested and validated using focus group discussions. The focus group discussions were necessary to test the validity and reliability of the study findings and proposed sustainable urbanisation framework.

CHAPTER 5: ANALYSIS OF EXPLORATORY STUDY

5.1. Background

This chapter highlights the findings of the exploratory study that was conducted with Riyadh residents (8), government experts and urban planning officials (6) and academics/researchers in urban planning (6). The study was undertaken in the following sub-municipalities: Nemar, Al-Naseem, Al-Olayyah, Al-Diriyah and Al-Ma'athar. Through the study, the researcher was able to gain deeper insight into the research topic with a view to refining the research questions and improving the filed study.

5.2. Methodology of exploratory study

The respondents to participate in the exploratory study were selected through the purposive sampling method. The reason for choosing this sampling method was to obtain a representative mix of respondents from varied age groups, professional background and location. Purposive sampling is further beneficial in minimizing researcher bias. Subsequently, the respondents were selected from the five municipalities of Riyadh including Al-Ma'athar, Al-Naseem, Olayyah, Al-Diriyah and Nemar. The selection of residents to participate in the study was done with the assistance of imams in the various mosques in the aforementioned municipalities. Government experts were approached via institutional channels through physical visits by the researcher to the local government offices. Beforehand, the researcher sent an email to arrange for an appointment. The academics and researchers were approached through their respective institutions of higher learning and were selected on the basis of their knowledge on urbanisation-related issues. The profiles of the respondents have consequently been outlined in Table 5-1.

Table 5-1: Profiles of participants in exploratory study

Resident	Location (Municipality)	Years spent in Riyadh
R1	Al-Naseem	24
R2	Olayyah	19
R3	Al-Ma'athar	23
R4	Nemar	9
R5	Al-Diriyah	12
R6	Olayyah	32
R7	Nemar	34
R8	Al-Naseem	28
Expert	**Location (municipality)**	**Years of experience**
E1	Nemar	16
E2	Al-Diriyah	19
E3	Al-Ma'athar	22
E4	Olayyah	20
E5	Al-Naseem	27
E6	Al-Ma'athar	21
Academic/researcher	**Location (municipality)**	**Years of experience**
A1	Olayyah	17
A2	Al-Diriyah	24
A3	Olayyah	29
A4	Al-Ma'athar	26
A5	Al-Diriyah	22
A6	Olayyah	19

The respondents were generally interviewed on their perspectives regarding the social, environmental, physical and political factors affecting the attainment of sustainable urbanisation in Riyadh. Furthermore, the respondents were interviewed regarding their perspectives on the strategies required to realise sustainable living and create sustainable communities in Riyadh. The social factors are the social issues that are related to urbanisation, which might either enhance or

inhibit the realisation of sustainable urbanisation in Riyadh. This is the same case with the environmental, physical and political factors, which are respectively environmental, physical and political issues that might hinder or enhance the realisation of sustainable urbanisation. Interviews with the categories of respondents identified the various social, environmental, physical and political issues related to sustainable urbanisation.

5.3. First Group – Riyadh Residents

5.3.1. Social factors

Most of the residents interviewed noted that increased population is the key social factor that will influence sustainable urbanisation. Their perceptions were generally informed by the fact that increased population has increased the competition and consumption of resources in the municipality, such as water. One of the residents (R4) attributed the increased population in Riyadh to international as well as international migration.

> *"Over the years that I have lived in Riyadh, I have seen the number of people in this city grow. Many of my friends are people who came from other places, such as Jeddah to come and study and look for employment in this place. Growing up, it was very rare to meet a white person in the streets. These days, you meet them everywhere in the markets and in the restaurants. Most of them work here and stay for many years"* – **Riyadh resident (R4)**.

Being the epicentre of the oil boom, it was inevitable that Riyadh would experience rapid urbanisation. Susilawati and Al-Surf (2011) note that the rapid migration of people into Riyadh occasioned a huge shortfall in housing units, which was the largest shortfall among all the Gulf countries. Many people from rural areas trooped to the municipality in search of job opportunities and higher education. International migrants were also attracted to the job opportunities provided by different international firms that have set up businesses in the capital. The result of this has been an increased consumption of water and electricity as well as depletion of natural resources and increased population.

Other residents identified the Islamic culture as a social factor integral in sustainable urbanisation. They believed sustainable housing should consider Islamic culture in its designs. One such resident (R2) lamented over the modern houses in Riyadh, which do not consider Islamic culture and the need for privacy.

> *"The modern buildings that are coming up are also different from the old ones in that they have a lot of glass windows. As a culture that values privacy, the use of these glass windows is unsuitable because your business or whatever you do is open for everyone to see. The*

high population growth has made it impossible for people to get their privacy and is a major cause of slums" – **Riyadh resident (R2).**

Indeed, Al-Surf et al. (2013) point out that many houses in Riyadh no longer consider the Islamic architectural designs, such as the *Mashrabiya* architectural design, which is the double decorative screening of windows to ensure privacy from outsiders. Consequently, the shift from Islamic architectural to Western architectural designs as is the case with the Mashrabiya has impacted negatively on privacy within families and among different households.

5.3.2. Political factors

Interview with the Riyadh residents also discovered that the municipality has not done enough to sustain urban development at the local level. The perception among the residents is that the municipality has not been strict in ensuring that the projects within the municipality are sustainable. One of these residents (R7) pointed out that the government has not been vigilant to ensure strict adherence to the Saudi Building Code (SBC).

"Part of the problem with urban planning is that the government has not been strict about developers who misuse land areas. I blame the government because they have not come up with policies to punish these developers. There has to be a balance between encouraging investment and maintaining our water sources" – **Riyadh resident (R7)**.

Similarly, Al-Surf et al (2013) notes that the implementation of SBC has been confronted by different challenges. One of them is that many Riyadh residents are not enlightened or aware of its existence as is the same case for private developers. This is compounded by the fact that not much is known about the mandate of the Saudi Building Code National Committee (SBCNC).

Another resident (R3) spoke about the importance of including the public in policy formulation, such as in the case of the SBC. He noted that this would enable the public to assist the local authority to monitor the adherence to this code by private developers.

"The local government should avoid this tendency of doing everything in secrecy without involving the public. We need to be educated on what these laws entail especially the building codes. Even as houses are built in the slums, we would like them to adhere to the building codes so that the houses are strong and better protected from storms and floods. Contractors who violate the building codes will also be scared because they will be under more scrutiny from the public. We should take a proactive role in holding the municipality authorities to account by ensuring that they take action against people who violate the building codes. In our case, we have notorious landlords whose houses are of poor quality and yet they charge us exorbitant prices. They do this because they know that we are

desperate for somewhere to live and assume that most of us do not care about the building codes – or that we are illiterate enough not to know the building codes" – **Riyadh resident (R3).**

Various reports and studies have highlighted the need for participatory governance in creating sustainable cities and communities. UNDP (2016) describes participatory governance as one that includes all the stakeholders involved in the urban planning and development process, including the private sector and city residents. This would ensure the formulation of policies that cater to the needs of the varied stakeholders. In line with the sentiments of R7, Future Saudi Cities Programme (2016) notes that policy formulation process in Saudi Arabia has been an exclusive exercise conducted with minimal input from the public regarding their needs. Bajaber (2017) notes that the urbanisation policies developed in the aftermath of the oil boom were conducted at the higher levels of governance and passed down to the municipalities for implementation.

5.3.3. Environmental

Interviews with the residents identified increased pollution as one of the key environmental factors that will influence sustainable urbanisation in the municipality. The residents interviewed further pointed out that pollution exists in many forms including emission of greenhouse gases, increased residential waste and noise pollution. One of the residents interviewed (R1) noted that industries have been a major contributor to increased pollution in the municipality particularly in the southern part of the city.

"As someone who works in the southern part of Riyadh, I can confirm that industrial pollution is quite rampant. There are many industries in that part of the city that produce a lot of waste products that pollute the atmosphere. The examples that I can think of are chemicals, such as asphalt and asbestos. Furthermore, there are many trucks in this area, which produce a lot of smoke from their exhausts. As a matter of fact, people working in these industries have to wear face masks although I don't think that this is helpful in the long run" – **Riyadh resident (R1).**

These sentiments resonate with the findings of various studies that have highlighted the role that Riyadh's road network plays in the decreasing air quality of the municipality. For example, GAMEP (2017) acknowledges that the increasing traffic congestion in the city has led to an increase in the emission of greenhouse gases into the atmosphere. This situation could worsen if the number of vehicular trips in the municipality increases in the next 15 years as projected by the Arriyadh Development Authority (ADA). By 2030, the vehicular trips in Riyadh will increase at 12 million per day (ADA 2015).

Residents further identified water scarcity as an environmental challenge that sustainable urbanisation efforts will have to handle explicitly. For example, one of the residents (R8) noted that water scarcity was more prevalent in poor quality houses that do not have sufficient sanitation facilities.

> *"Personally, I have not been affected as far as my privacy is concerned. But, my heart goes out to those people living in the slums. If you listen to their stories, they will tell you how they do not have enough water supply and hence have to share among themselves. This is also the same case with sanitation facilities, such as toilets that you will find that two families are sharing,"* **- Riyadh resident (R8).**

Being a semi-arid country, water scarcity is not a problem that is unique to Saudi Arabia. However, the problem has worsened as a result of rapid urbanisation, which has consequently increased the demand and consumption of water (DeNicola et al. 2015). Poor sewerage treatment by the municipality has also increased the risk of groundwater pollution through the seepage of untreated wastewater into the underground.

5.3.4. Physical factors

Some of the residents interviewed decried the quality of the houses constructed, which do not provide privacy for them. These residents were of the opinion that the modern houses being constructed in the municipality have deviated from the Islamic architectural designs of the yesteryears, which ensured that different families could enjoy their privacy. One of these residents (R2) pointed out that villas were the only type of structures that could guarantee privacy albeit they are not affordable.

> *"The only type of houses that can guarantee you privacy are the ones that are found in the villas. However, they are very expensive for many of us to afford them unless you are a foreigner working with the big companies. The affordable ones are not as private as you would like them to be. Slum dwellers are the most affected because they have to share almost everything from toilets to water sources",* **- Riyadh resident (R2).**

The challenge of affordable and quality housing is a problem that has afflicted Riyadh ever since it experienced an oil boom in the 1970s, which was followed by rapid urbanisation. The rapid urbanisation – precipitated by migration as well as increased fertility rates – led to an increased demand for housing. This increased demand was coupled with increased international migration into the municipality, which heightened the demand for villas. JLL (2017) notes that 27,000 villas targeted at expats were added to the Riyadh housing market in 2017. Emphasis on Western architectural design has resulted in a compromise on privacy, which is an essential feature for all

Saudi dwellings. Al-Surf et al. (2013) reiterate on the need to include Islamic architectural designs in the green building concept to cater to Saudis who are the majority in the housing market.

Regarding infrastructures, some of the residents were of the opinion that the municipality has not encouraged walking by not constructing enough walkways. These residents noted that the people have become too dependent on private cars to the extent that the focus of the government has been on construction of more road networks to accommodate the increasing car ownership. One such resident (R4) noted that the failure to construct enough walkways has led to congestion in the few walkways available.

> *"The fact that we have a lot of oil has encouraged people to buy cars because the price of fuel is affordable. People do not give much thought to take a walk sometimes. Even the shortest destinations warrant the use of cars. And then again, pollution of the air also contributes to poor walkability. How can you walk in the streets when you are always inhaling a lot of smoke produced by cars in the roads? You would be better off using a car where you are better secured from the smoke. There are also some areas where the municipality has not constructed enough walkways. The few that are there are often crowded with people. How can you feel comfortable walking when you keep bumping into people? You cannot even take a stroll with a friend and have a leisurely, comfortable conversation without bumping into other people,"* – **Riyadh resident (R4)**.

This resident's sentiments resonate with Ledraa's (2015) study, which notes that urban planners in Riyadh have shown a bias towards the construction of road networks instead of providing more walkways in the municipality. In contrast, most walkways are located in the traditional neighbourhoods of the city.

5.3.5. Sustainable living

Many of the respondents interviewed spoke of the need for renewable energy to replace the non-renewable energy forms that have caused increased air pollution in the municipality. One of the residents (R1) however expressed reservations about the viability of renewable energy resources noting that they are considered unaffordable.

> *"I was reading an article by someone whose name I can't remember in which he was arguing for the adoption of solar energy to reduce electricity costs. In government circles, I know of plans to encourage the use of renewable energy although many people are still unsure of the costs"*- **Riyadh resident (R1)**.

The adoption of renewable energy forms has been a contentious issue in Saudi Arabia especially in the housing sector. Al-Surf et al. (2013) notes that many private developers have been reluctant

to install renewable energy materials, such as solar panels because of the high costs involved in importing these materials from other countries. Furthermore, many residents are unaware of the benefits of renewable energy resources and thus are hesitant to adopt it. To this end, GAMEP (2017) reiterates the importance of increasing public awareness about the benefits of renewable energies.

5.3.6. Sustainable communities

One of the key issues highlighted by the residents interviewed was the need to invest in more recreational facilities. Most of the residents noted that the local government has invested a lot of resources towards infrastructures, such as roads and building at the expense of recreational facilities and green spaces. One of the residents (R4) who commented on this issue noted that the lack of recreational and green spaces is attributable to the laxity by municipality officials as well as lack of laws to guide the construction of green spaces.

> *"We need tougher laws that make it mandatory for every area to have a recreational space where people can play and relax. It is not only about tougher laws but municipality officials who do not follow the law should be punished and fired from their jobs. Buildings that are constructed on recreational space must also be demolished no matter the cost spent on building them,"* – **Riyadh resident (R4).**

Indeed, various scholars have highlighted Riyadh's poor record in the provision of green spaces. Almayouf (2013) for instance, reveals that Riyadh lags behind other cities, such as New York and Curitiba with regards to the proportion of green space per capita.

Some of the residents who spoke about recreational space further highlighted the importance of recreational space in increasing social cohesion among the municipality residents. One of the respondents (R2) pointed out that most recreational space in Riyadh has been taken over by other infrastructures, such as houses, commercial buildings and road networks.

> *"Recreational space is also a necessity because they need a place to sit and relax with family members and friends. Most of the recreational space has been swallowed up by residential areas,"* – **Riyadh resident (R2).**

These comments about the benefits of increased recreational and green space resonate with various reports and studies that have highlighted the significance of green space. For example, UNDP (2016) notes that increased recreational space helps improve social cohesion within the city and reduce spatial inequality by providing a venue where city residents of varied socioeconomic backgrounds can congregate and socialise with one another.

5.4. Second Group – Government Experts and Urban Planning Officials

5.4.1. Social factors

Interviews with the experts highlighted the increased population in Riyadh as a key social barrier that will affect sustainable urbanisation. Most of the experts who spoke about the population increase admitted that the municipality was already facing challenges in providing the residents with effect services because of increased demand and consumption of these services. In particular, one official (E3) noted that the increased population growth has diverted the municipality officials' attention from the need to build more walkways.

> *"The population of Riyadh has increased – I think by now we are almost hitting 20 million, if am not wrong. Our mistake as those responsible for urban development is that we have not changed with the times. By now, all the stakeholders concerned with urbanisation should have drawn up plans for increasing infrastructural facilities, including walkways that can accommodate the increasing number of people who use these facilities. I understand the frustrations of the average resident because I have also used these walkways and sometimes it is very unpleasant to bump into people"* – **Government representative (E3).**

The low prioritisation attributed to the construction of walkways is attributable to many residents' dependence of the use of private cars as the chief mode of transport. Ledraa (2015) notes that the municipality has not fared well in enhancing walkability by increasing the tree cover in the city but has instead focused on expansion of the road network, which has further encouraged many residents to invest in private cars.

Another influential social factor that was mentioned by the experts – insofar as sustainable urbanisation is concerned – was the allocation of resources by the municipality. The respondents pointed out that the municipality was encountering challenges in the distribution of resources in lieu of the increased population in the city. One official (E1) cited water as an example of a resource that the municipality has struggled to ensure equal access to all residents because of the increased consumption and demand for the same. He further pointed out the need for public awareness programmes on the importance of conserving water resources to mitigate water scarcity.

> *"It is my belief that the public needs to be educated on the importance of protecting water resources. With the exception of those in the slums, I must admit that most people in this city do not appreciate the need to safeguard our water aquifers. I would not blame them because they do not understand how aquifers work and that their wanton destruction can leave us facing a dire water crisis. The public education forums may involve the media who*

can help broadcast programs to educate people on the importance of protecting water resources. We can also have TV programmes on the same. As a municipality, we are exploring the possibility of putting up posters with information on the same or supplying residents with booklets containing this information. Our schools should also help us by educating students on the various water resources that we rely on as well as the need to protect them. This way, our young ones will grow up with the knowledge of why water is an important resource that must be safeguarded by all means" – **Government representative (E1).**

The need for public awareness on water conservation is an issue that has been similarly highlighted in other fora. GAMEP (2017) earmarks public awareness programmes as a strategy for enlightening the public on the side effects of excessive water consumption. Likewise, DeNicola et al. (2015) state that the public should be educated on alternative methods of acquiring water, such as harvesting of rainwater.

5.4.2. Political factors

Poor policies related to urban planning and development were noted by most experts as the key political factor influencing sustainable urbanisation. The perception of these experts was that the current policies would not be effective in tackling the various sustainable urbanisation-related issues, including waste management, noise and air pollution as well as natural resource management. One of the officials (E4) reiterated on the need for new policies considering that the current ones are not cognisant of the population growth in Riyadh since the 1960s.

"No, new policies must be formed for new strategies: It is a no-brainer that sustainable urbanisation practices must be guided by relevant legislation that lays out modalities for implementing them. Our current laws do not consider the fact that the population of Riyadh since the 1960s has increased two-fold – and still continues to increase. Remember, I said that knowledge-based research has greatly influenced present deliberations on the formulation of new policies. However, the use of these empirical studies has not been widely adopted. I believe that it is important or would be helpful to engage the services of foreign experts from countries that are already using sustainable practices in their urbanisation processes. Finding such experts would not be difficult because we already have UN HABITAT and UNFPA as some of our partners in this urbanisation process. These experts can lend us their experiences on how policies that are friendly to sustainable urbanisation were developed. Their involvement would also help us tackle any challenges that we would face when developing these policies for sustainable urbanisation"- **Government representative (E4).**

These sentiments resonate with the findings of Future Saudi Cities Programme (2016), which points out that urban planning and development policies in KSA are inflexible and unsuited to the changing circumstances in the major KSA cities.

Coordination among the various urban planning and development agencies was another political issue that reverberated during the interviews with the experts. The experts interviewed were unanimous that there needs to be improved coordination between the local authorities and the central government for the success of sustainable urbanisation efforts. One of the officials (E2) bemoaned the exclusion of local authorities from the policy formulation process, which complicates their implementation of the resultant policies.

> *"Part of my responsibility as an employee of the local government is to ensure that the set development strategies are implemented to the letter. However, this has been a hard task considering that the coordination between our local government and the ministries has been lackluster. I have a bone to pick with the fact that the higher level people formulate laws without even consulting us people on the ground. Yet, this is very important because we are the one who interact with the local people on a daily basis. So, we are in a better position to know and understand the pressing issues affecting them and possible solutions to alleviate these problems. Furthermore, we are the ones entrusted with implementing these strategies that are developed at the ministerial level as well as by the local government. Only then will we be able to implement strategies that we fully understand. Sometimes, implementing these strategies becomes difficult because the locals do not understand why these strategies are there in the first place. When we are included in the process of developing these strategies, then we will be able to explain to the locals why these strategies are beneficial to them. This is how to make our jobs easier," –* **Government representative (E2).**

Riyadh residents has been one category of stakeholders that has been excluded from the urban planning and development process. Future Saudi Cities Programme (2016), for example, notes that the one of the barriers to formulating effective policies on urban planning legislation in KSA is the lack of public involvement in the process.

5.4.3. Environmental factors

The experts identified the air quality in Riyadh as a major environmental factor that will affect sustainable urbanisation. The overall perception was that the air quality in Riyadh has deteriorated due to certain activities. One official (E2) blamed the increased air pollution on the increased number of cars on the roads.

> *"Sustainability must also be environmental friendly that is why the increasing number of cars has become an issue. These cars have led to increased air pollution hence we need to look into alternative fuel other than fossil fuels,"* – **Government Representative (E2).**

Being one of the world's leading producers of oil has precipitated an increased car ownership in KSA generally – and in Riyadh in particular. The effect of private cars on the air quality is often manifested during the peak hours when the Riyadh experiences traffic congestion on its roads.

Some of the experts interviewed also mentioned about the adoption of renewable energy resources as a critical environmental factor. One official in particular (E5) admitted that the municipality has generally not fared well in adopting renewable energy systems.

> *"The land shortage has prompted careless building of houses even in places where they are not warranted. We have depleted our natural resources to the extent that water availability is threatened. If you are aware of our history, we have mostly depended on groundwater resources to harness water. Unfortunately, these resources are non-renewable and when used careless, there is the risk of creating a water scarcity. My fear is that the increased demand for land for construction purposes may affect some of our sources for water, including aquifers,"* – **Government representative (E5).**

Al-Surf et al. (2013) note that one of the challenges that face the adoption of renewable energy – particularly in the housing sector – is the apprehensiveness over the affordability of these resources. To this end, GAMEP (2017) proposes public awareness programmes on the benefits of renewable energy sources.

5.4.4. Physical factors

A key physical factor that was mentioned by most experts is the poor land use occasioned by poor land allocation strategies in the municipality. The experts perceived these poor strategies as a key reason for the increasing urban sprawl as many residents find it difficult to access land. One of the officials (E6) noted the fact that very few land areas have been allocated to recreational spaces and walkways.

> *"Some of the land has ended up being converted into slums where low quality buildings are built. Even within these slums, you will find that the footpaths are quite congested because these buildings are situated close to each other. I guess that we need a rethink of our land allocation strategy in order to proportionally allocate land for things, such as walkways and recreational facilities, among others,"* – **Government representative (E6).**

In their study, Bidgood et al. (2017) note that there has been a scarcity of land as large swathes of land are under the ownership of government institutions whereas land speculators hold on to vacant land in the hope that the value of these lands will increase.

Another physical factor affecting sustainable urbanisation is the encroachment on natural resources by private developers or members of the public in general. Experts who spoke on this factor noted that Riyadh has been affected by land misuse where people build properties on undesignated areas. One of the respondents (E5) noted that one of the challenges has been the encroachment on natural resources, such as water aquifers and agricultural land.

> *"As a municipality, one of our major concerns has been about the encroachment on natural resources by private developers. This is a problem that not only affects Riyadh but also the entire Saudi Arabia. The demand for housing has tempted many private developers to encroach on land areas, such as deserts and agricultural land to build houses and offices,"* – **Government representative (E5).**

One of the land areas affected by human encroachment is Wadi Hanifa valley, which is home to several water aquifers that provide water supply to the city. Abdallah (2017) notes that the valley was encroached upon by farmers in a bid to find water for irrigating their farms. This was as the urban boundaries of the municipality expanded.

5.4.5. Sustainable living

Some of the government experts interviewed identified the high cost of houses as a barrier to increased access to quality housing for many residents in the municipality. For example, one official (E2) pointed out that most affected people by the high prices of houses are the rural outmigrants.

> *"As a visitor in Riyadh, you may not know it but the truth is that most people have been unable to afford modern housing. These people have been forced to move to the slums or informal areas. Some of them are people who come from the rural areas to find work in the city, which is not often a walk in the park,"* – **Government representative (E2).**

Susilawati and Al-Surf (2011) note that the influx of migrants into Riyadh has created a shortfall in the housing sector. This shortfall is the largest among all the other countries in the Gulf region.

5.4.6. Sustainable communities

To create sustainable communities and curb urban sprawl, the experts emphasised on the need for proper legislation. They pointed out that legislation that correlates to the situation on the ground would ensure an orderly urbanisation process. One of the officials (E4) noted that proper

legislation would ensure that all development projects in the future apply the principles of sustainability.

> *"If we continue urbanizing without any particular plan that is not guided by appropriate legislation, then there is the risk that our problems, such as inadequate water supply, urban sprawl, poor garbage disposal and pollution of the environment, will worsen. Thus, all development projects in the future – including housing, factories and mining – should apply the principles of sustainability,"* – **Government representative (E4).**

These sentiments resonate with Bajaber (2017) who notes that the urban sprawl in Riyadh has been aided by ineffectual legislation. Furthermore, the development of a Master Plan for the municipality was undertaken rather belatedly after the urbanisation process has picked up pace. In the aftermath of the exponential growth of Riyadh owing to the oil boom, Greek-based Doxiadis Associates was tasked with preparing the first Master Plan for the city. The Master Plan – consequently approved by the Council of Ministers in 1973 – was to provide the basis for the development of Riyadh until the year 2000. One of its proposals was that the city should develop an open-ended pattern with a central spine that would accommodate the dynamic growth of Riyadh's population. The spine would house administrative and central commercial businesses that would be able to expand concurrently with the residential zones in the city. Another proposal of the Master Plan was a hierarchical street pattern as part of a balanced transportation network. The plan consisted of a supergrid running in the east-west and north-south directions to segment the city into six large divisions of which each contained 8-12 localities of 2x2 km (Al-Hathloul 2017).

The physical plan for the urban development of the city consisted of a civic and commercial spine extending to the north and south of the business district. The residential zones would be located along the sides of the civic and commercial spines. Moreover, administrative areas would be situated perpendicularly to the aforementioned spines as well as the residential zones. As per the Master Plan, private automobile would be the chief mode of transportation with the transportation network consisting of the following: four major freeways; expressways; arterial roads; and collector roads. Whereas the collector roads were meant to serve short urban trips, the arterial roads were intended to facilitate movement of long-distance urban trips.

However, the pitfall of the Master Plan is that it underestimated the extent of urban growth that was to occur in the late 1970s. Furthermore, it contradicted itself by recommending a compact city but limiting the overall density at 140 p/h (Al-Hathloul 2017).

5.5. Third Group – Academics/Researchers

5.5.1. Social factors

According to the experts, the cultural background of the municipality is a key social factor to consider in sustainable urbanisation. One of the academics (A1) pointed to the building code as an example that the current housing sector does not consider the Islamic cultural needs in the construction of new houses.

> *"Unfortunately, what we have seen is that most of the modern buildings have discarded the Islamic architectural designs of the past. Even the building code that was developed is more westernised and does not consider our unique cultural needs"* – **Academic/Researcher (A1).**

Another academic (A6) noted that the adoption of Islamic architectural designs would actually enhance sustainability.

> *"Even as the focus is on sustainable housing, we should not forget that Islamic building designs were generally environment friendly. Islamic houses were designed to adapt to the desert environment and there was no need for the use of air conditioners that is used frequently nowadays"* – **Academic/Researcher (A6).**

Indeed, Sirryeh (2018) notes that Islamic architectural designs enhance air quality in the house as well as prevent accumulation of dust particles inside the house.

5.5.2. Political factors

Most of the experts interviewed pinpointed the lack of coordination among stakeholders as a major political barrier to sustainable urbanisation. One respondent in particular (A1) noted that the academia has not been involved in the urbanisation process notwithstanding the fact they are experts in matters urban planning and development.

> *"The role of us as academics in discussions on sustainable urbanisation has been really limited. Yet, most of us have undertaken extensive studies on urbanisation issues; the empirical evidence we have may guide other stakeholders on what needs to be done"* – **Academic/researcher (A1).**

Similarly, Future Saudi Cities Programme (2016) highlights the need for urban planning officials to coordinate with the academia for purposes of building the capacity of the former.

5.5.3. Environmental factors

Interviews with the experts also highlighted natural resource depletion as a major environmental threat to sustainable urbanisation. One of the academics (A3) attributed the depletion to the

increasing population of the municipality as well as the rapid urbanisation. In particular, is the water scarcity, which he pointed out that was becoming synonymous with the city.

> *"It's only natural that when the population increases then the consumption of resources will also increase. Take the example of energy and water in Riyadh; our urban authorities have had a hard time providing enough water to satisfy everyone's demand"* – **Academic/researcher (A3).**

Similarly, Dube (2017) points out that the water scarcity problem in the country and in Riyadh could worsen in the coming years as the demand for water increases.

5.5.4. Physical factors

Haphazard development of infrastructures was identified as a key physical factor that may impede sustainable urbanisation. Some of the experts interviewed complained that the increased urbanisation rate has led to increased construction of unstable structures that lack basic amenities or facilities. Indeed, Al-Surf et al. (2013) bemoan the fact that many modern structures do not afford families the privacy that they need as was the case in the yesteryears. Additionally, increase in municipal waste has made it hard for the municipality to effectively provide sewerage services. This increases the risk of untreated waste polluting the groundwater resources.

5.5.5. Sustainable living

One of the strategies to enhance sustainable living as mentioned by experts is the need for updated policies that guide the adoption of sustainable practices and development. One academic (A5) proposed a policy that would provide incentives to companies that make use of smart technology in their buildings.

> *"Undoubtedly, there's need for the use of sustainable materials in building new residences. But the problem is that these materials may be very expensive because you have to import them from abroad. I think the government should give incentives to real estate developers so that they can import these materials at cheaper prices or rates,"* – **academic/researcher (A5).**

Noteworthy is that the exorbitant costs of importing smart building materials has been an impediment to the adoption of sustainable housing materials (Al-Surf et al. 2013).

5.5.6. Sustainable communities

The experts emphasised on the need for participatory governance by involving the local communities in urban planning and development. One of the academics (A2) spoke of the importance of town hall meetings where members of the public have the chance to air their views of various processes affecting their lives.

> "The voice of the people needs to be heard more. The municipality should invite residents to town hall meetings where the public can contribute to debates on how to improve policies and legislations on urbanisation," – **Academic/researcher (A2).**

Similarly, UNDP (2016) notes that this form of governance allows members of the public to hold their leaders accountable for their actions. It also ensures that the destiny of an entire municipality is not decided or entrusted to a cabal of leaders.

5.6. Conclusion

Each of the categories of respondents has provided their perspectives on the social, environmental, political, physical and economic factors affecting sustainable urbanisation in Riyadh. Additionally, they have provided their perspectives on the strategies to enhance sustainable living in the city. Noteworthy is the similarities in some of their perspectives regardless of their differences in profession, location, gender and years of residence in Riyadh.

These are the emerging points from this chapter:

- Increased population has been an influential social factor in urbanisation and will continue to impact sustainable urbanisation;
- Water scarcity, natural resource depletion and air pollution are key environmental issues affecting Riyadh;
- Lack of public awareness on various issues (e.g. renewable energy, sustainable housing, water conservation) may be an impediment to sustainable development;
- There is need for multi-stakeholder involvement in urban planning and policy formulation;
- The housing sector should incorporate Islamic architectural design in sustainable housing;
- Sustainable urbanisation and development will only become a reality when anchored on relevant policies and legislations that take into account the needs and concerns of the residents; and
- Sustainable and affordable housing is a key requirement in Riyadh.

Consequently, the data gathered from this exploratory study was important in identifying issues that should be interrogated further in the main study. These issues were captured in the form of questions, which were added to the questionnaire for the main study. Additionally, the exploratory study unearthed certain challenges that could emerge in the main study with regards to data collection. One of these challenges was the cultural barrier affecting women in which women cannot be interviewed alone without the presence of a male member of their families or without their consent. Another challenge was the language barrier affecting Riyadh residents most of who could not understand sustainable urbanisation concepts. In certain instances, the interviewer experienced difficulties in translating these concepts into the Arabic language, which is the language of communication for most Saudis. This was a process that took time and in certain instances changed the meaning of the questions.

CHAPTER 6: INTERVIEWS ANALYSIS

6.1. Introduction

The purpose of this chapter is to highlight and analyse the interviews conducted with the different categories of respondents including experts (E), Riyadh residents (R) and academics (A). The chapter identifies the issues that were put across by the respondents with regards to the thematic areas focused on in the interview questions. Furthermore, based on the responses, this interview analysis seeks to identify a sustainable urbanisation framework that can be integrated into the future development of urban areas within Saudi Arabia.

6.2. Method

This chapter is a product of a two-stage process involving the transcription and analysis of the data collected through interviews with the aforementioned categories of respondents. The transcription process entailed transferring the data collected into Microsoft Word format. The data collected was either in the form of audio devices or field notes – particularly in instances where the respondents were not comfortable with being recorded. Thereafter, the research utilised Nvivo 12 data analysis software for qualitative analysis of the transcribed data. This was undertaken by first transferring the transcribed data into Nvivo 12 where they were filed as Main Themes (referring to the six main themes of the study) and as individual transcripts. The interviewees' responses were then autocoded by creating six nodes representing the six main themes in the study after which the researcher identified key issues or sub-themes by reading through the responses to the interview questions. These issues or themes were then related manually to the respective nodes. It is these issues or sub-themes that have been highlighted in this chapter with regards to the six themes/research questions of the study.

6.3. Experts

Semi-structured interviews were conducted with 20 experts who have worked at different levels of government on urban planning. Table 6-1 provides a profile of the urban planning experts interviewed for the study.

Table 6-1: Profile of urban planning experts interviewed for the main study

Expert (E)	Government institution	Length of experience (years)
E1	Ministry of Municipal and Rural Affairs (MOMRA)	8
E2	Arriyadh Development Agency (ADA)	10
E3	Regional government	5
E4	Ministry of Economy and Planning (MoEP)	10
E5	Arriyadh Development Agency (ADA)	8
E6	Riyadh Municipal	10
E7	MOMRA	12
E8	Riyadh Municipal	8
E9	MoEP	5
E10	Regional government	6
E11	Regional government	7
E12	MOMRA	10
E13	Regional government	13
E14	Arriyadh Development Agency (ADA)	10
E15	MOMRA	13
E16	Riyadh municipal council	10
E17	Arriyadh Development Agency (ADA)	15
E18	Regional government	20
E19	Riyadh municipal council	11
E20	Riyadh municipal	10

6.3.1. Drivers and barriers of sustainable urbanisation

Using semi-structured interviews, the study sought to identify – according to the perceptions of the government representatives /experts – the drivers and barriers of sustainable urbanisation in Riyadh.

6.3.1.1. Barriers

These are the factors or issues that hinder the successful adoption of sustainable practices in Riyadh by different stakeholders, including residents, government officials and the private sector, among others. Figure 6-1 outlines the interviewing process on the barriers to sustainable urbanisation as well as the resultant findings and the issues identified as far as the proposed SU framework is concerned.

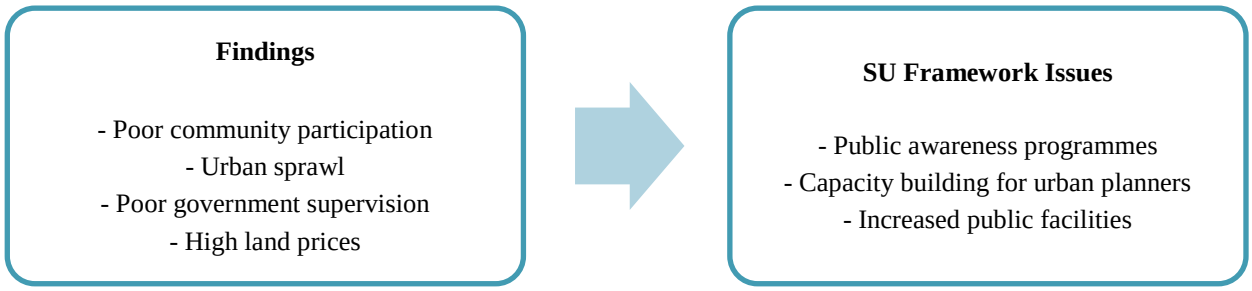


Figure 6-1: Interview process of urban planning officials/experts on barriers to sustainable urbanisation

Interviews with the urban planning experts identified various barriers to sustainable urbanisation (See figures 6-2-1/6-2-2 for detailed).

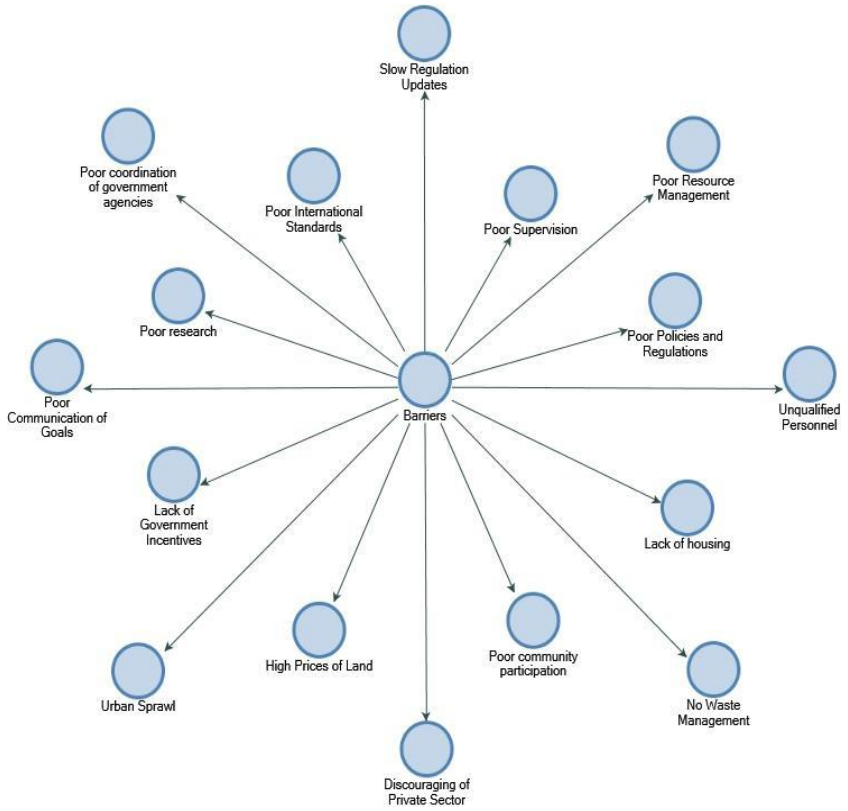


Figure 6-2-1: Relationships in theme barriers of sustainable urbanisation

Figure 6-2-2: Hierarchy in theme barriers of sustainable urbanisation

- *Poor community participation*

The majority of the experts interviewed bemoaned the poor community participation as an impediment to successful adoption of sustainable urbanisation practices. Most of those who held this view attributed the poor community participation to an uninformed and un-empowered public that was thus unable to cooperate with the government in realising sustainable urbanisation, such as proper disposal of residential waste and monitoring of those who violate building codes. One of the respondents (E20) dared the interviewer to do a survey in the streets of Riyadh by asking passers-by if they understand the meaning of sustainable urbanisation.

> *"If you do a survey of the municipality right – just take a walk into the streets and ask anyone you come across. You will find that many of them do not understand by what is meant by this term sustainable urbanisation"* – **Expert (E20).**

His prediction echoes the findings of Al-Surf et al. (2010) study that revealed that over 52% of the members of the Saudi public do not understand the meaning of sustainability. Consequently, efforts to achieve environmentally sound, healthier and affordable projects have been unsuccessful (Al-Surf and Mostafa, 2017).

Nonetheless, most of the respondents also admitted that the government is responsible for empowering residents so that they can take a proactive role in implementation of sustainable practices. They observed that thus far the municipality has not performed well as far as information sharing is concerned. One such respondent (E12) noted that the public will be more supportive of the government's efforts to actualise sustainable urbanisation only if they are knowledgeable on the advantages of sustainable practices.

> *"The local people of Riyadh have still not understood what the government means by sustainable urbanisation. The fault lies with us because maybe we have not done enough to educate the public on what sustainable urbanisation entails. If the public understand the advantages of sustainable urbanisation, it will be even very easy to supervise and monitor the implementation of the various laws that focus on urban planning. In short, they will be more supportive"* – **Expert (E12).**

That information flow from government circles down to the local citizenry has been wanting is not in dispute. Garba (2004) for instance, notes that the development of policies and regulations by the central government did not take into account the reality on the ground by consulting the local citizenry.

- *Poor policies and regulations*

Another barrier to sustainable urbanisation that was prominently mentioned by the experts is poor policies and regulations related to urban planning. One of the respondents (E14), for example, pointed out the need to improve the current policies so that they reflect the current state of affairs insofar as urbanisation in Riyadh is concerned.

> *"I think current policies and regulations are the main obstacles which hindering the attainment of sustainable urbanisation. I think these policies and regulations need to be reassessed to identify pros and cons in order to modify them properly to keep up with the current urbanisation and sustainability issues"* – **Expert (E14).**

Similarly, Garba (2004) notes that agencies tasked with implementing urban plans have been inhibited in their mandates by the existence (or lack of) inadequate laws for supporting their operations. He further points out that the existing laws were formulated as a result of technical resolutions, directives and multiple statues. These laws or regulations are not comprehensive and aligned to the prevailing planning issues of urban planning because they are outdated and not updated regularly (Garba, 2004). The inadequacy of current policies and legislations in guiding the sustainable urbanisation process is confirmed by UNHABITAT (2016), which notes that the laws are not flexible enough to be adapted to the changing circumstances of the urbanisation in Riyadh. One of these changing circumstances is the population of Riyadh, which continues to increase as the fertility rates increase and more internal and international migrants move to the city each year. This has affected the waste management system that is continuously burdened by the increased population. Consequently, one of the respondents (E3) lamented about the challenges the municipality is encountering in waste disposal because of outdated urbanisation laws.

> *"We still follow poor methods to dispose waste by burning and filling, this method of disposal is risky to the environment and communities surrounding these facilities"* – **Expert (E3).**

Anjum et al. (2016) warn that the use of outdated waste disposal methods may compound environmental problems in the long term. Noting that most of the landfills are nearing full capacity, the authors point out that there is the risk of methane emissions into the atmosphere, which may cause air pollution and health complications. Due to the slow degradation of waste underground, these landfills may be unsuitable for human settlement for a very long time.

- *Poor government supervision*

Interestingly, some of the experts interviewed admitted that poor government supervision stands in the way of sustainable urbanisation. Upon further probing, some of the respondents cited the building code as an example of a regulation whose successful implementation has been hampered by poor government supervision. One of the respondents (E8) was blunt in his assessment of how the government – the local government in particular – has been efficient at monitoring adherence to the building code.

> *"The blame is also on us because we have not been strict in supervising the construction of these old neighbourhoods to ensure that they follow the building codes and planning law"* – **Expert (E8).**

The government's inability to effectively monitor the implementation of building codes in Saudi Arabia has been the subject of various studies and reports. For example, Al-Surf et al. (2013) reveal that the lack of regulations from the government has hindered the adoption of sustainable building methods and materials in the construction sector. Al-Sharif (2013) adds that the weakness of the municipal has been one of the greatest stumbling blocks towards sustainable housing and has instead precipitated the emergence of informal settlements that lack basic necessities, such as water and electricity. This is a problem that is not only confined to Riyadh but also other cities, such as Jeddah (Al-Surf et al., 2013).

6.3.1.2. Drivers

These are factors or issues that may enhance sustainable urbanisation. Most of the respondents identified the economic boom in KSA and political will as major drivers of sustainable urbanisation (See figures 6-4-1/6-4-2 for detailed and Figure 6-3).

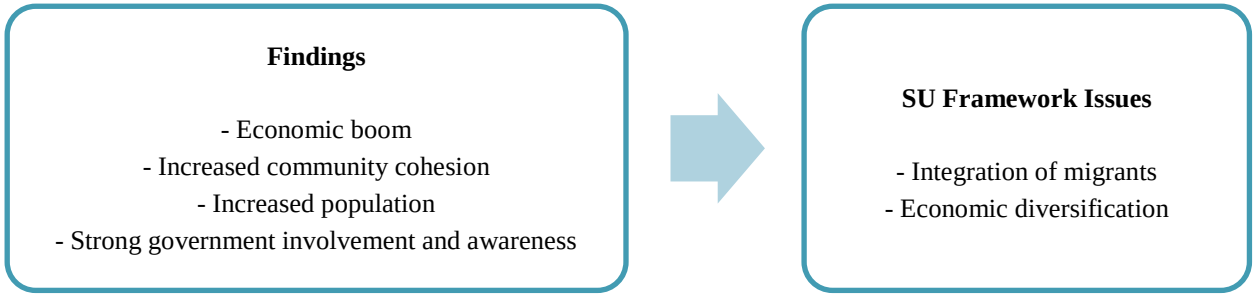


Figure 6-3: Interview process of urban planning officials/experts on drivers of sustainable urbanisation

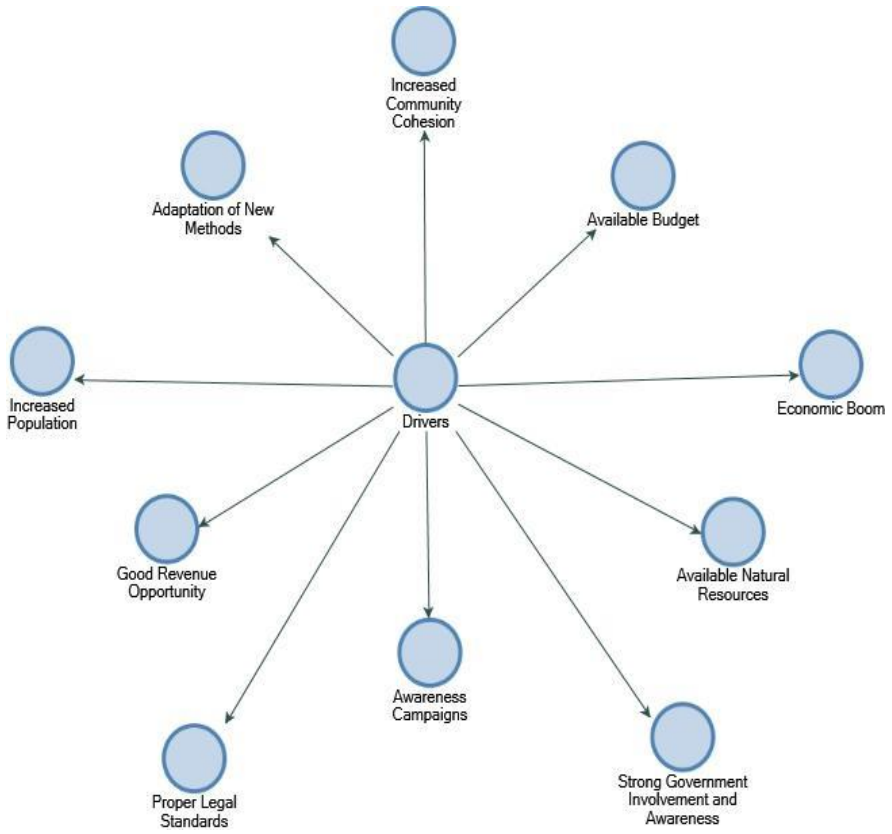


Figure 6-4-1: Relationships in theme drivers of sustainable urbanisation

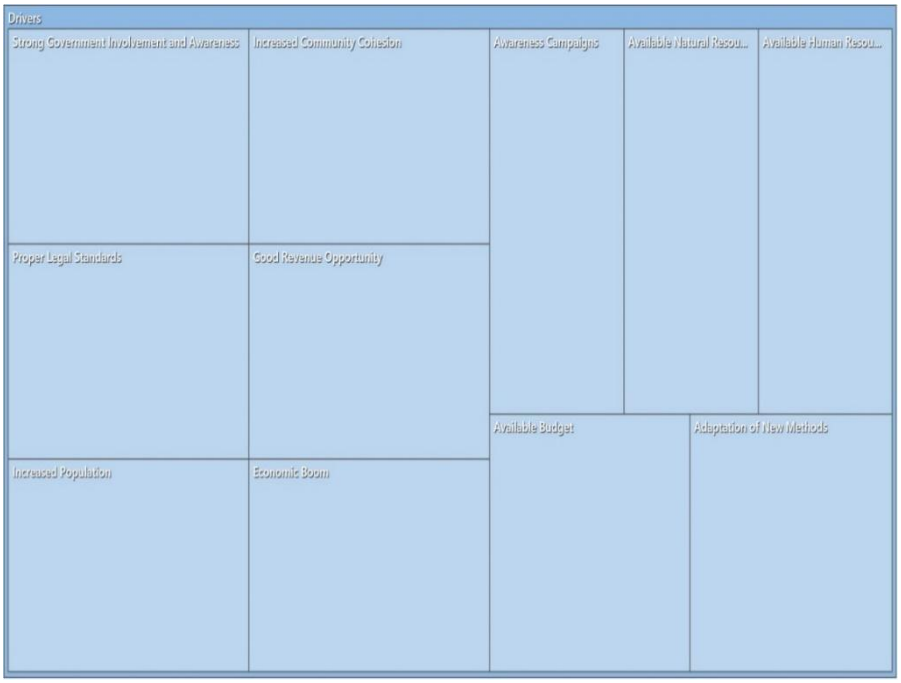


Figure 6-4-2: Hierarchy in theme drivers of sustainable urbanisation

- *Economic boom*

Most of the respondents who perceive economic boom as a major driver of sustainable urbanisation cited oil revenues as a major source of funds for sustainable urbanisation projects. One respondent (E13) attributed the current urbanisation in Riyadh to the economic growth attained in the kingdom in the last 40 years.

> *"I think basic drive for sustainable urbanisation is the economic renaissance occurred in Saudi Arabia during the last 40 years which changed the life of the city greatly"* – **Expert (E13).**

His sentiments echo those of Garba (2004) who reveals that Riyadh was already growing at a rate of 8% yearly when the oil boom began in 1970. This exponential growth rate continued even in the aftermath of the oil boom. There were widespread development projects in the municipality – as well as in the kingdom – as a result of the massive financial resources accrued from the export of oil (Garba 2004).

- *Political will*

Noteworthy, despite mentioning poor government supervision as one of the barriers to sustainable urbanisation, many of the respondents also mentioned the political will among the political actors as a driver of sustainable urbanisation. An example is this respondent (E7) who stated that the political will has been exhibited in the way the government has allocated funds towards development projects.

> *"I believe the key driver is that our government and its bodies are highly concerned with sustainability and development issues and they used to allocate big funding and budgeting to our development projects"* – **Expert (E7).**

The fact that the government is committed to improving development in Riyadh and other parts of KSA is not in doubt. The presence of a youthful and strong leadership in the royal family has raised prospects of modifications to legislations and regulations in every sector with a view to propelling the kingdom forward (Al-Surf and Mostafa 2016). This determination has resulted in the formulation of the National Transformation Plan 2020 (NTP 2020) and the 2030 Saudi Vision. One of the key objectives of NTP 2020 is to exploit resources for supporting future projects – including sustainability-based ones. This political will has not only been concerned with financially supporting these projects but also engagement of the public. Al-Surf and Mostafa (2016) note that the deputy Crown Prince of KSA has an ambitious roadmap aimed at encouraging the proactive engagement of the community as part of 2030 Saudi Vision.

6.3.2. Improving the quality of life

This theme consists of questions aimed at identifying the ways in which sustainable urbanisation can improve the quality of life (Figure 6-5). From the semi-structured interviews conducted with the residents, the following issues were identified as the products of sustainable urbanisation (See figures 6-6-1/6-6-2 for detailed).

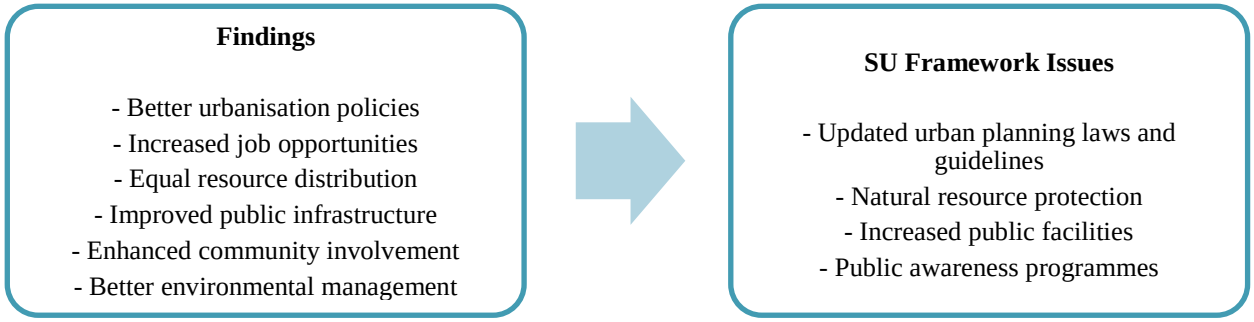


Figure 6-5: Interview process of urban planning officials/experts on improving quality of life

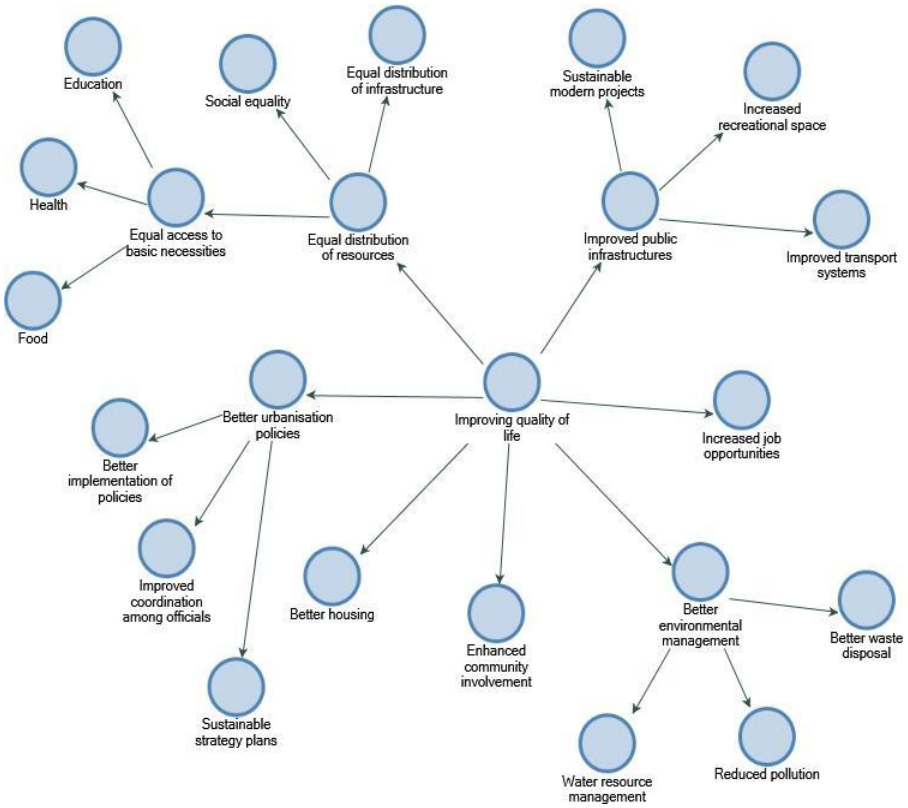


Figure 6-6-1: Relationships in theme Improving Quality of Life

Figure 6-6-2: Hierarchy in theme Improving Quality of Life

- *Better urbanisation policies*

According to most experts in the government, better urbanisation policies can improve the quality of life in Riyadh by guiding the sustainable urbanisation process. Upon further probing, most of the residents reiterated on the need for these policies to cater for all the issues related to sustainable urbanisation. This was better captured by this comment from one of the respondents (E1).

> *"The policies and regulations should be flexible enough and more comprehensive so that they can address all issues of the city and any potential problems may emerge in the future"* – **Expert (E1).**

Formulation of flexible and relevant policies – as suggested by the aforementioned expert – represents a break from the past where policy formulation has been reactionary. Garba (2004) notes that the history of policy formulation in the kingdom was done whereas the rapid urbanisation was already occurring. To date, policies on urban planning have not been cognisant of the increasing population in Riyadh and are thus inadequate for handling emerging issues related to urbanisation.

Some of the respondents noted that one category of residents whose quality of lives can improved due to better urbanisation policies are women. They reiterated on the importance of gender equality to enable women access more opportunities in the job market and education. One such respondent (E2) expressed optimism that sustainable urbanisation will consist of policies to afford more opportunities for women to improve their welfare.

"Policies enhance the role of the Saudi women in the society, as women are given more opportunities in the education and work environment," – **Expert (E2).**

To its credit, the Saudi government has made huge strides in improving opportunities for women, especially in the education sector where the net enrolment of girls has increased to match that of boys. According to Alsaleh (2012), the net enrolment increased from 82% to 96.5 in 2001-2011. Indeed, Hamdan (2016) notes that the illiteracy rate among women has reduced to the point that illiterate women might soon become a minority among Saudi women. On his part, Al-Saud (2018) attributes the increasing enrolment of women to the increasing recognition and acknowledgement by the Saudi government that educated women can contribute immensely to the socioeconomic development of the country.

- *Better environmental management*

Respondents also noted that sustainable urbanisation can improve the quality of life through better environmental management. The experts proposed various strategies as part of sustainable urbanisation that can enhance better environmental management, such as improved waste management, reduced pollution and development of more recreational facilities, green spaces and parks, among others. One of the respondents (E16) proposed the adoption of energy efficient methods that do not harm air quality.

"I propose that Riyadh should depend on clean and renewable energy for some environmental concerns, and the government should enhance using alternatives such as solar energy and wind power energy because they are cheap and available as well as friendly to our environment," – **Expert (E16).**

This sentiment echoes that of Alshehry (2015) who emphasises that economic growth should be undertaken in consideration of its effects on the environment considering that an increase in per capita GDP and per capita energy increases the likelihood of CO_2 emissions. Economic development strategies should minimise CO_2 emissions as well as energy use (Alshehry, 2015).

Some of the respondents also emphasised on the importance of encouraging walking to realise better environmental management. They further pointed out the need to construct more walkways for use by residents as a way of increasing walkability. This was captured by sentiments of one of the respondents (E15).

"We have urgent requirements in our city and the main one in my opinion is how to establish an environment which respects walkability, and this can be implemented through best approached and international practices," – **Expert (E15).**

Ledraa (2015) attributes the lack of waterways to the bias showed by city planners towards city-motorized forms of transport in which the focus has been to build more infrastructures to accommodate the increasing number of cars. Thus, pedestrian-friendly environment has been shunned as residents prefer to use cars as their main modes of transport, rather than walking. Focus on the city-motorized forms of transports further brings into focus the land use strategies. Most of the land area is used for residential purposes and commercial buildings thus leaving minimal space for enough recreational parks and gardens as well as walkways.

- *Improved public services*

Some of the experts interviewed admitted that sustainable urbanisation would improve the quality of life for residents by enabling these experts improve on their delivery of essential public services, such as water, health, education, sanitation and transport, among others. For example, in lieu of the persistent threat of water scarcity, the use of sustainable water management methods, such as treatment of waste water, would increase the supply of water to the residents. Nonetheless, most of the respondents agreed that the government can do more to improve the provisions of essential services, including health, education and public transport. One respondent (E12) noted that the government should be aware that the population of the city has increased, which calls for an improvement of the current public infrastructure.

> *"We should be alert to the fact that the population of Riyadh, which implies the need to improve and upgrade the infrastructure as required," –* ***Expert (E12)***.

Health is undoubtedly one of the crucial services required by residents of Riyadh as well as in the whole of Saudi Arabia. Yusuf (2014) notes that one of the challenges inhibiting efficient delivery of health services is the lack of enough qualified medical personnel. The access to basic services for Riyadh residents has been at varied levels depending on the different regions. According to Alshammari (2011), most of the development projects have been concentrated in the northern part of the city that is home to high-income earners in contrast to the south (Alshammari, 2011).

Many of the respondents also noted that improved public services should also be manifested in the form of improved public transport. Indeed, the introduction and implementation of a public transport system has been one of major challenges confronting Riyadh as the availability of cheap private cars and affordable fuel has led to the increase in the number of car ownership in the city. One respondent (E15) highlights the fact that a public transport system will save on energy that is used up by the availability of a lot of private vehicles on the roads.

> *"The public transport project will provide suitable means of transport and reduce the use of private vehicles and this will help in saving energy also," –* ***Expert (E15)***.

This is the same opinion expressed by Alshammari (2011) who acknowledges that the enactment of the public transport project could help reduce traffic congestion on the roads in addition to improving the air quality in Riyadh, which has been littered with emission of harmful gases, such as greenhouse gases. However, efforts aimed at introducing a public transport system may be confronted by cultural challenges in that men and women would be forced to ride in the same buses, which is in contradiction to the Saudi culture.

6.3.3. Social, environmental and historical factors affecting sustainable urbanisation in Riyadh

The following social, environmental and historical factors (See figures 6-10-1/6-10-2 for detailed) were identified during the interviews with the urban planning experts.

6.3.3.1. Social factors

The process of interrogating respondents on the social factors affecting sustainable urbanisation is indicated in Figure 6-7.

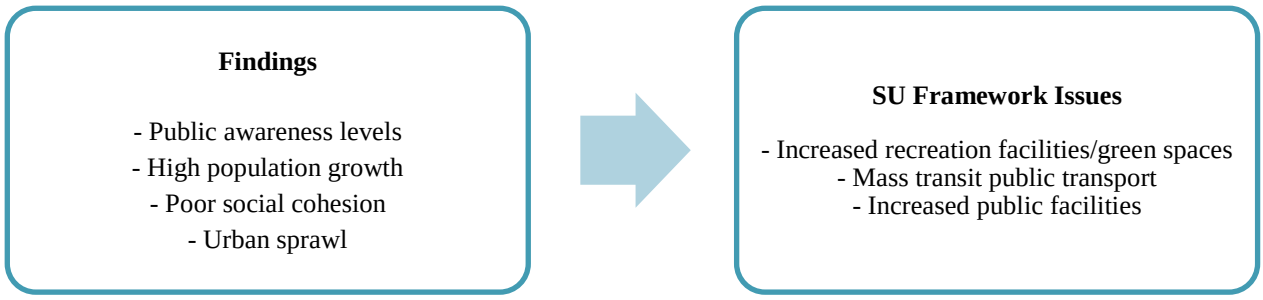


Figure 6-7: Interview process of urban planning officials/experts on social factors affecting sustainable urbanisation

- *Public awareness*

Most of the experts interviewed noted that the level of public awareness will influence the success or failure of sustainable urbanisation practices. Most of them reiterated on the need to enlighten the public on the various sustainable practices that will contribute to a sustainable urban centre – in this case, Riyadh. One of the experts (E10) went further and suggested that these awareness programmes should also encompass private developers and the private sector in general.

> *"I believe that developers, public and private sectors staff and those who work in urban planning need advice and instructions on using land correctly, scientifically and realistically, so we have to educate them and focus on them before we focus on community members, because the distribution of land use is illogic and unscientific",* ***- Expert (E10).***

Similarly, other studies have identified low levels of public awareness as an impediment to the actualisation of sustainable urbanisation in the municipality, as well as Riyadh in general. Al-

Surf's et al. (2013) study, for example, notes that many stakeholders in the municipality are not knowledgeable on sustainable urbanisation and sustainable housing. Consequently, the government's efforts to encourage the adoption of smart technologies as part of sustainable housing have been unsuccessful. Instead, most private developers have resorted to the use of unsustainable building materials that cost them a lot of money in the long run – a cost which is subsequently passed on to tenants in the form of high rent prices. One other respondent (E2) identified the mass media as a helpful platform for increasing people's awareness regarding sustainable urbanisation and the relevant practices.

> *"The most important action is the spreading awareness through prints and publications, social media and other mass media" –* ***Expert (E2)***.

Indeed, the use of mass media as a platform for creating awareness has proven efficient as far as other initiatives in KSA are concerned. Zowawi et al. (2015) reveal that the social media has been helpful in educating the masses in the Gulf countries on the proper use of antibiotics. Similarly, Kiefer's (2015) study reveals that Saudi Arabia boasts one of the most active social media platforms in the Middle East region where 40% of Twitter users in the region are Saudi citizens.

- *High population growth*

The experts also identified the rapid population growth rate in Riyadh as another social factor that will influence sustainable urbanisation in the city. Those interviewed identified several links between the rapid population growth rate and various issues arising in the municipality. For instance, one of the respondents (E20) attributed the increase in house rents to the rapid population growth.

> *"The population of Riyadh is increasing every day and every year. This phenomenon is responsible for the increase in the rents of many housing units in this municipality," – Expert (E20).*

The aforementioned sentiment is corroborated by the findings of Al-Surf's et al. (2013) study, which indicate that Saudi Arabia has the largest deficit in residential homes compared to other countries in the Gulf, such as Bahrain, UAE and Oman. The deficit is attributable to the rapid population growth occasioned by migration into Riyadh from the rural areas as well as international migrants. Additionally, Al-Surf et al. (2017) notes that affordable housing has become a significant issue of concern for many people in Riyadh especially for public sector employees who now no longer enjoy certain perks that previously allowed them to take a mortgage from financial institutions. Another study by real estate company Knight Frank (2014) confirms

that housing prices are set to increase as the population of Riyadh increases. This is attributable to the fact that the demand for housing in the municipality has outpaced the supply.

6.3.3.2. Environmental factors

As indicated in Figure 6-8, respondents were interviewed regarding their perceptions of how the environmental situation in Riyadh will impact sustainable urbanisation.

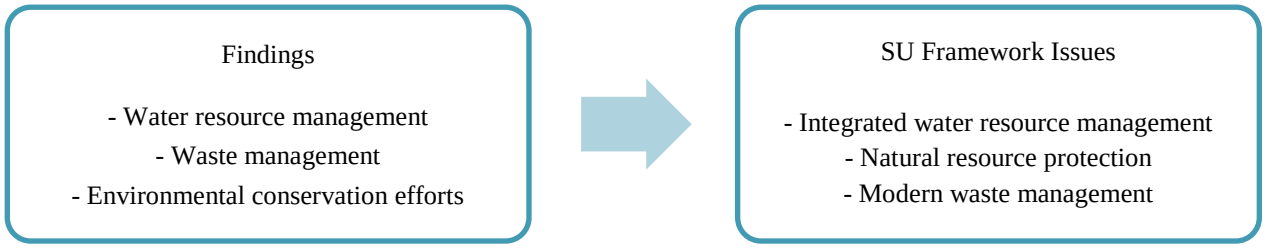


Figure 6-8: Interview process of urban planning officials/experts on environmental factors affecting sustainable urbanisation

- *Environmental conservation efforts*

Most experts interviewed expressed hope that the current environmental conservation efforts by the government would positively impact sustainable urbanisation in Riyadh. An analysis of the majority of the comments brought to the fore the importance of preserving the country's natural resources. One respondent in particular (E8) emphasised the importance of natural resource conservation in view of KSA's arid climate.

> *"Being an arid and semi-arid kingdom, it is important that we jealously guard our natural resources for posterity and sustainability, "– **Expert (E8)**.*

This line of thought correlates to that expressed by GAMEP (2017) in its report in which it prioritises the development of natural resources. GAMEP (2017) acknowledges the fragility of the kingdom's ecosystems, a situation that is attributable to its geographical location. Thus, it is vital that these natural resources are treated with utmost care to ensure that they are able to provide for the well-being of all Saudis for generations to come. Another key issue highlighted by many respondents with regards to environmental conservation efforts is waste management. Most of the respondents reiterated on the importance of the concerned agencies upping their efforts as far as waste management is concerned. One of the respondents (E20) suggested that the municipality should source for land where more waste can be disposed of.

> *"My opinion is that the municipality must explore possibilities of finding alternative land areas where we can dispose of more waste" – **Expert (E20)**.*

Proper waste disposal is one of the conservation issues that the municipality has been cognisant of and has embarked on actualising. For example, GAMEP (2017) reiterates the importance of integrated waste management, which involves the proactive participation of residents who should be enlightened and encouraged to reduce waste through recycling and reuse. Such efforts can enhance sustainable urbanisation by alleviating the waste build-up in landfills. Anjum et al. (2016) warn that congestion of landfills may precipitate environmental hazards through methane emission, which may pollute the environment.

- *Water resource management*

As an arid and semi-arid city, most experts noted that management of water resources will determine the success or failure of sustainable urbanisation. The availability of water resources have been hampered by the increasing population in the municipality, which has subsequently increased the demand for water and outpaced the supply of the same. Most of the respondents were of the opinion that stronger mechanisms should be enacted to ensure that water resources are managed prudently for the benefit of the generations to come. One of these respondents (E11) voiced his support for an integrated management system to boost water resource management via solid regulations and urban legislations.

> *"In my opinion, the best policies which would enhance the management of water resources is the integrated management system that comprises strong regulations, rules and urban legislations that can address problems and issues related to land use and water resources,"* – ***Expert (E11).***

This opinion resonates with that of GAMEP (2017), which emphasises on the importance of an integrated management of water resources, which contributes to achieving a balance between supply and demand by meeting the long-term and short-term needs of all sectors.

6.3.3.3. Historical factors

Figure 6-9 indicates the interview process on the historical factors affecting sustainable urbanisation.

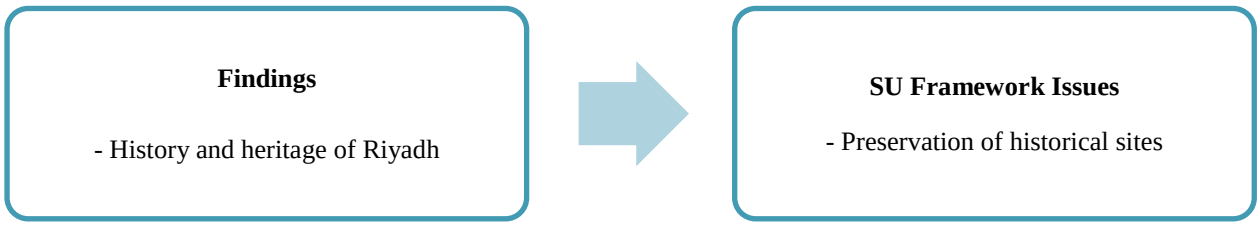


Figure 6-9: Interview process of urban planning officials/experts on historical factors affecting sustainable urbanisation

- *History and heritage of Riyadh*

Many of the respondents pointed to the history and heritage of the city as an influential historical factor that will influence sustainable urbanisation. For example, one respondent (E1) noted that the old buildings that were made in line with the Arabic/Islamic architecture could slowly disappear in favour of sustainable housing.

> *"Historically, Riyadh is the city of history and heritage, the city is full of old buildings and palaces, but unfortunately these buildings are going to disappear as a result of new constructions," – **Expert (E1)**.*

One of the issues that have confronted sustainable housing has been the development of new residences in line or conformity with Islamic architectural design. Al-Surf et al. (2013) note that modern residences have shunned Islamic architectural designs in favour of modern designs that have been borrowed from the Western culture. In the yesteryears, traditional Saudi neighbourhoods were characterised by high walls and gardens in addition to a stream of houses that were sharing walls.

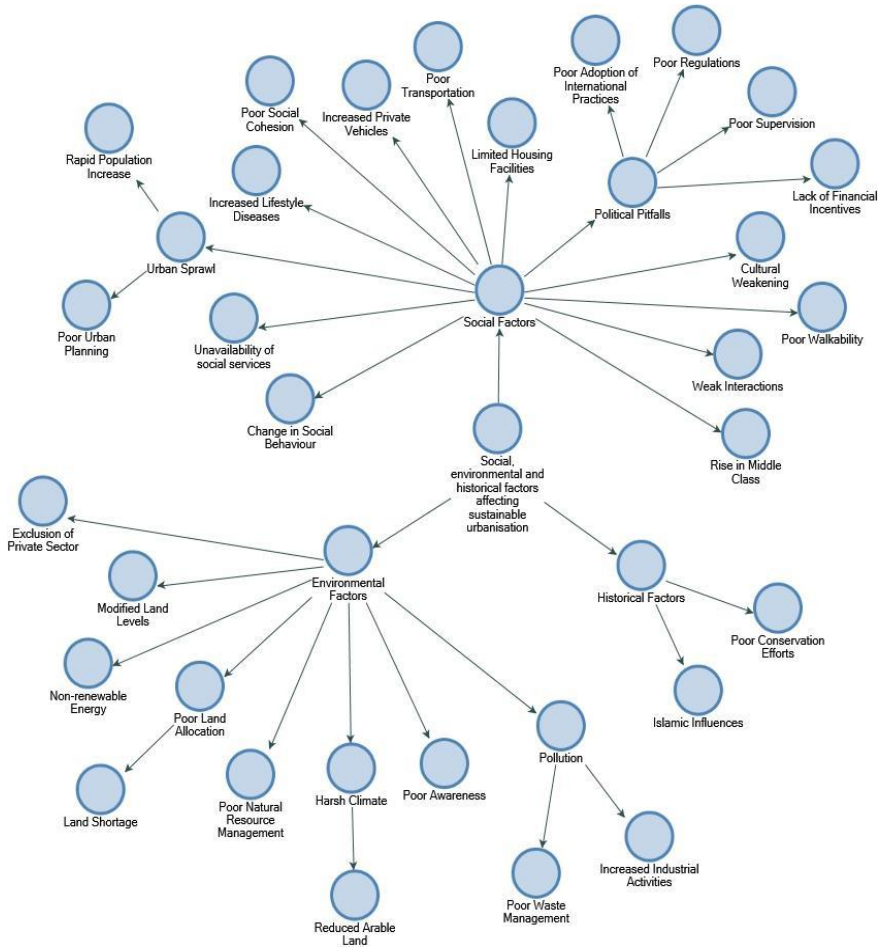


Figure 6-10-1: Relationships in theme Social, Environmental and Historical Factors

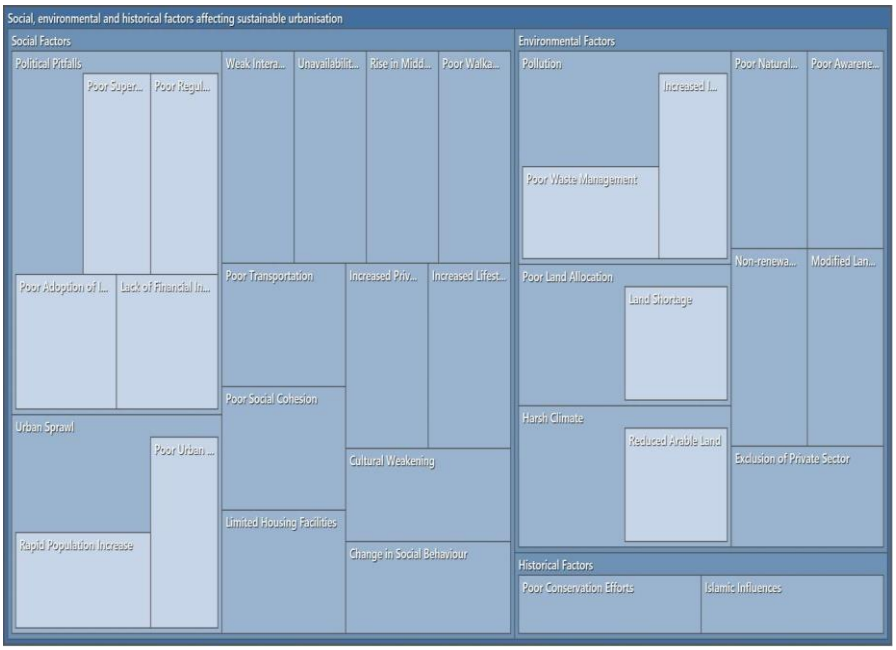


Figure 6-10-2: Hierarchy in theme Social, Environmental and Historical Factors

6.3.4. Challenges in Planning for Sustainable Urbanisation

Respondents were asked of their perceptions of the challenges that urban planners face in planning for sustainable urbanisation (See figures 6-11/ 6-12-1/6-12-2 for detailed).

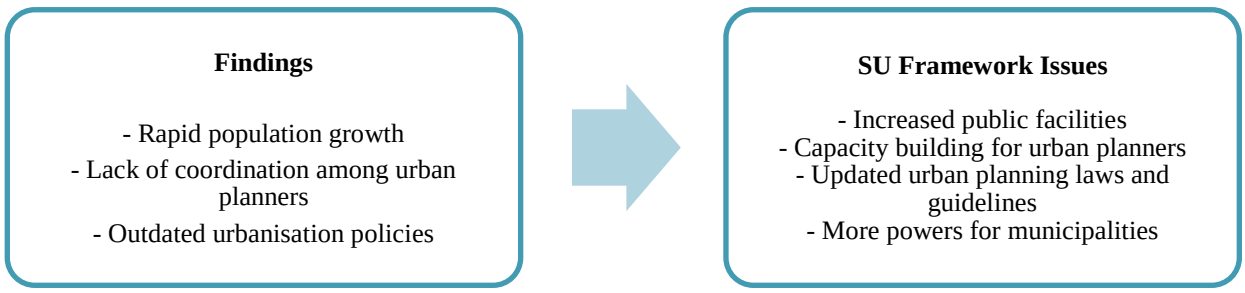


Figure 6-11: Interview process of urban planning officials/experts on challenges in planning for sustainable urbanisation

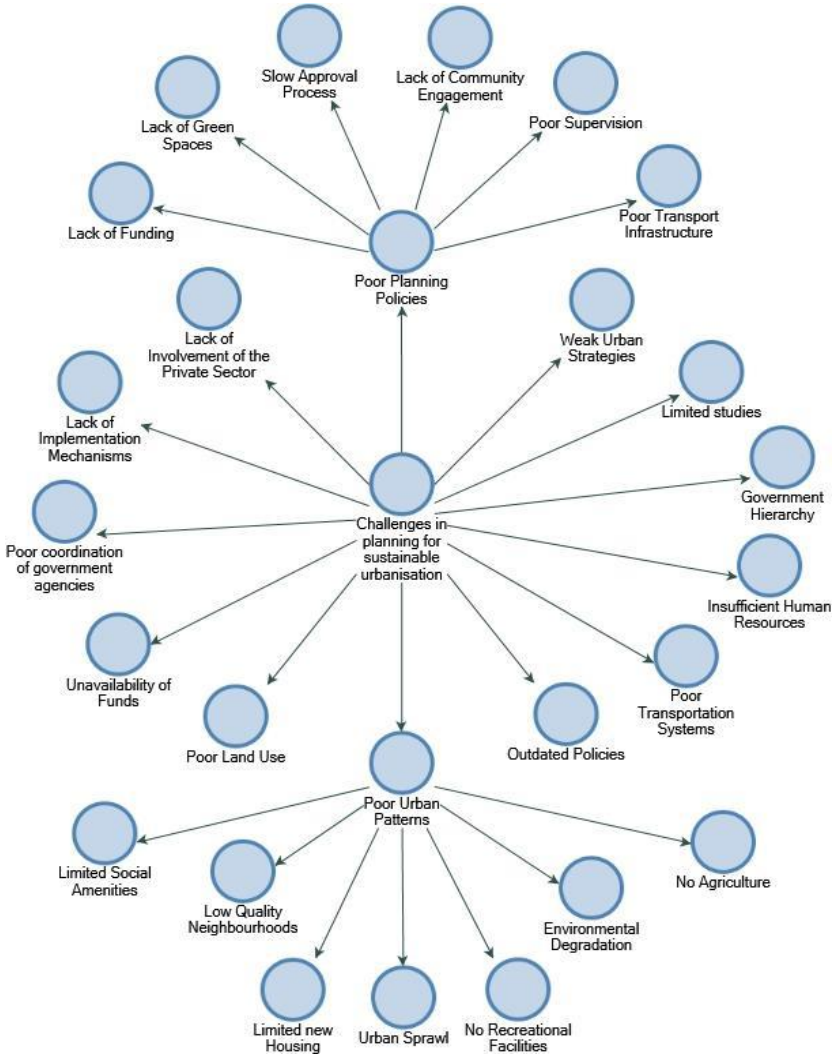


Figure 6-12-1: Relationships in Challenges in Planning for Sustainable Urbanisation

Figure 6-12-2: Hierarchy in theme Challenges in Planning for Sustainable Urbanisation.

- *Outdated urbanisation policies*

Most of the experts interviewed for this study acknowledged that outdated urbanisation policies and frameworks are the biggest impediment to their functions as far as sustainable urbanisation is concerned. They highlighted the fact these current policies and legislations are not concurrent with the reality on the ground. An example is the following respondent (E16) who faulted the policies for focusing on residential use while ignoring the other aspects of land use.

> *"I think planning policies focused on residential use and ignored other uses and this focusing created a planning gap which caused insufficiency in services and infrastructures provided,"* – **Expert (E16).**

This statement is corroborated by Alshammari (2011) in his paper in which he faults the Real Estate Development Fund (REDF) of 1974 under which many residents were provided with loans to build or purchase homes. The downside to this policy was that the density ration declined while many other people migrated to the suburbs to avoid the high cost of building residential properties. Garba (2004) points out that the implementation of REDF proved counterproductive eventually as it led to land speculation as well as urban sprawl. Indeed, many of the respondents blamed the outdated policies and frameworks for the urban sprawl in the city. One of the respondents (E14) attributed the urban sprawl to the poor land use policies.

> *"The land-use policies hinder sustainable planning because current policies created the urban sprawl in Riyadh,"* – **Expert (E14).**

Alshammari (2011) notes that the urban sprawl resulting from the implementation of REDF left the local government in a precarious situation as it struggled to improve the coverage of its services to a wide area.

- *Rapid population growth*

After outdated urbanisation policies and frameworks, the second major challenge in planning for sustainable urbanisation – as cited by the experts interviewed – is the rapid population growth in Riyadh. Most experts interviewed noted that the increased population has increased the demand for housing and other basic services in addition to reducing the amount of available land. One of the respondents with this point of view was E12:

> *"This is mostly because of the huge population we have in this city. The urban sprawl has increased the need for more space to build new houses and buildings for businesses,"* – **Expert (E12).**

That the rapid population growth would increase the demand for land is not in dispute considering the massive transformation of Riyadh from a tribal settlement to a megacity. Garba (2004) points out that the rapid transformation was unpredictable and difficult to understand and manage. The absence of institutional structures and resources to guide the urban expansion process further compounded matters. The rapid population growth has also come with its fair share of social problems, such as the increased unemployment rate. UNDP (2016), for example, warns that unemployment will continue to be a problem for Saudi Arabia – along with other Middle East countries, such as Jordan and Iraq – whose youth populations are projected to grow by over 20% in the coming 15 years.

Most of the respondents attributed the rapid population growth to the influx of migrants into the city, both from rural areas and foreign countries. For example, one of the respondents (E15) noted that the international migrants have grown the demand for housing.

> *"Influx of international migrants in Riyadh has increased the demand for housing, which has necessitated expansion of the urban space to accommodate this additional number of residential properties"* – **Expert (E15).**

Indeed, statistics indicate that the number of villas and apartments – which are mostly targeted at expats in Riyadh – have increased in recent times. JLL (2017) notes that an additional 25,000 units of standalone villas and apartments were expected to enter the market in 2017 in response to the need for more residential properties of this kind. Nonetheless, it is not only international migrants that the respondents blamed for the increased population. One of the respondents (E1) noted that the migration of other Saudis to the city from rural areas has caused an increase in demand for services.

> *"I believe the main challenge in Riyadh city is the urban expansion which is resulted from increased population and the migration of citizens from rural areas to urban areas seeking for better lifestyles,"* – **Expert (E1).**

Indeed, it is not out of place to attribute the increased population – and subsequent pressure on public services – to rural-urban migration. Similarly, Al-Surf et al. (2013) points out that the Riyadh's economic growth marked it out as a land of opportunities, which attracted many Saudis from other areas to migrate to the city in a bid to better their livelihoods.

- *Lack of coordination among government officials*

Some of the experts interviewed admitted that poor coordination among government officials is a challenge in planning for sustainable urbanisation. One such respondent (E10) noted a disjointed coordination between legislative bodies and various agencies.

> *"The lack of coordination between the various agencies and legislative bodies has prevented both sides from speaking from the same page,"* – **Expert (E10).**

This is similar to the observation made by Garba (2004) who states that the institutional structure as far as urban planning is concerned is such that all the relevant agencies work independently of each other and at cross-purposes. Another one of the respondents (E3) decried the interference of urban planners by implementing projects without consulting the architectural experts.

> *"Another challenge is that the current planners interfere with projects implemented and designed by consultancy offices without consultation or review by Saudi specialists in architecture and planning in Riyadh and they are only satisfied with what is provided by these offices,"* – **Expert (E3).**

Such a complaint is nothing new considering that the agencies tasked with urban planning have been afflicted by an overlap in roles. There is no tangible definition on the specific roles and functions to be carried out by each agency, which consequently precipitates a situation where an agency is performing a function that should be ideally performed by another agency (Garba, 2004).

6.3.5. Impact of rapid urbanisation on desert and arid land

The urban planning experts were interviewed on their perceptions of how rapid urbanisation in Riyadh has affected desert and arid land (Figure 6-13). Subsequently, the experts provided various perspectives or impacts on the same (See figures 6-14-1/6-14-2 for details).

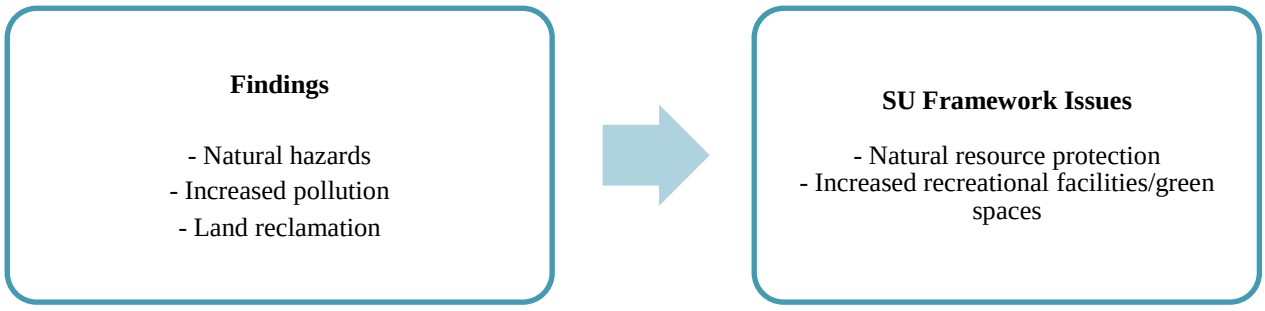


Figure 6-13: Interview process of urban planning officials/experts on impact of rapid urbanisation on desert and arid lands

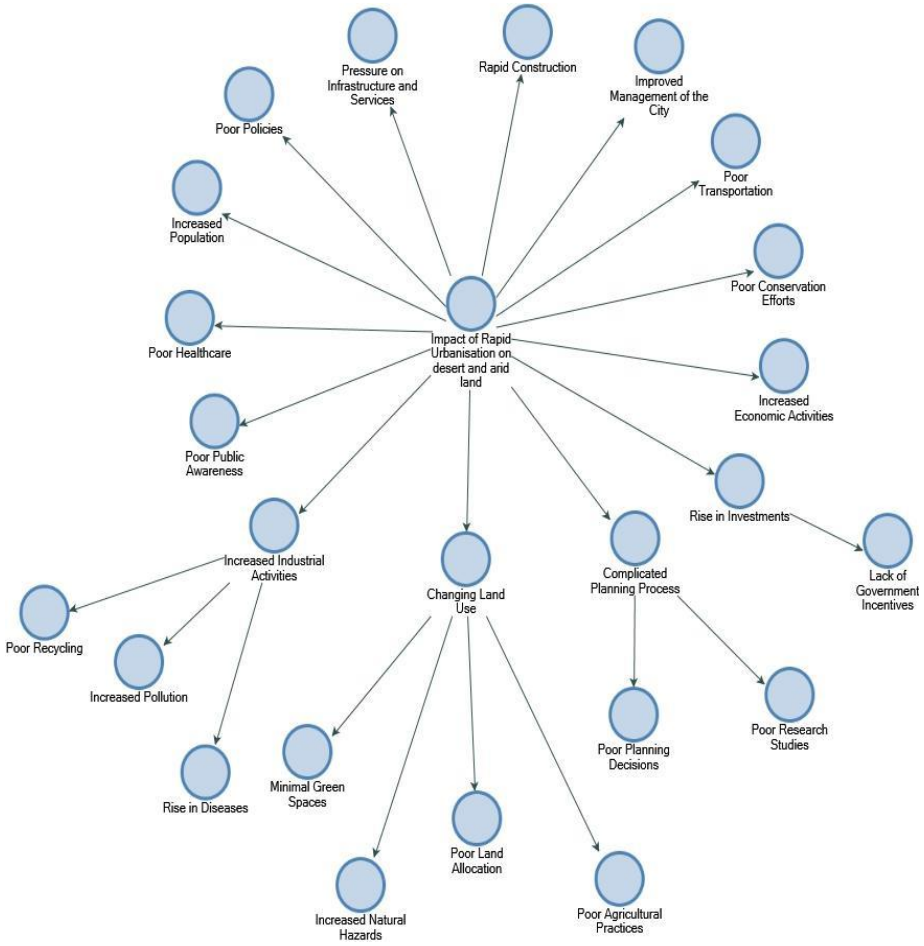


Figure 6-14-1: Relationships in theme Impact of Rapid Urbanisation on Arid Land

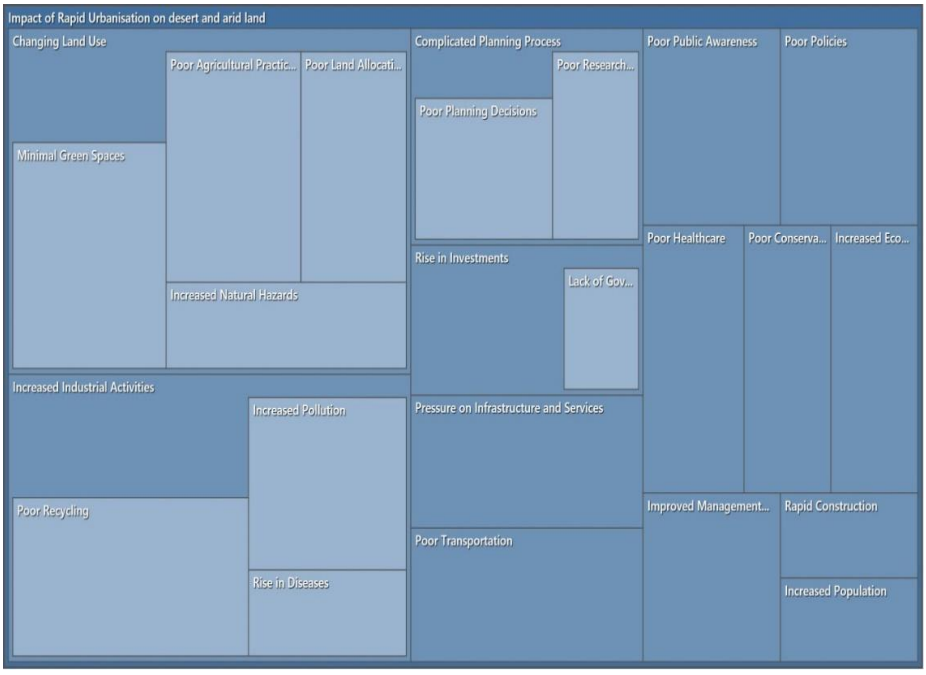


Figure 6-14-2: Hierarchy in theme Impact of Rapid Urbanisation on Arid Land

- *Natural hazards*

Most experts interviewed for this study admitted that the rapid urbanisation has increased the risks of natural hazards in the municipality. Indeed, GAMEP (2017) notes that Riyadh – and Saudi Arabia in general – has been afflicted by occasional floods as well as drought considering that it experiences an arid and semi-arid climate. Consequently, GAMEP (2017) acknowledges the need for initiatives and strategies geared towards increasing the value of natural resources. One of the respondents (E1) took note of past efforts to restore water channels in the city and to prevent the recurrence of floods.

> *"Efforts are made to restore water channels in east and west of the city, and this restoration is intended to control flooding events in the city and drain storm water is considered as one of the main problems of the city," –* ***Expert (E1)***.

Wadi Hanifa Valley is a prominent example of an area that has benefited from such efforts to prevent recurrence of natural hazards on desert and arid land. This geographical feature has borne the brunt of rapid urbanisation in the city where urban planning has not been cognisant of the natural hazards. Muneerah (2015) notes that this has been heightened during the rainy season in Riyadh – March to April – during which the valley experiences flash flooding as a result of rainwater travelling at 60 km per hour. Nonetheless, efforts by municipal authorities have transformed the valley into a tourist attraction. This is exemplified by the wetlands in the southern region of the valley, which have become a favourite spot for recreational activities, including fishing, swimming and picnicking. It is noteworthy that the perceptions of experts regarding the impact of rapid urbanisation on desert and arid land are positive when compared to the perceptions of Riyadh residents on the same. It is striking that out of all the experts interviewed only one of them had a negative perception of the impact of rapid urbanisation on desert and arid land.

> *"I have not seen how the current projects are considerate of any natural hazards that may occur," –* ***Expert (E20)***.

- *Increased pollution*

Many of the experts interviewed attributed the increasing pollution in the desert and arid lands as a consequence of rapid urbanisation in Riyadh. One such respondent (E11) noted that rapid urbanisation has depleted groundwater levels in the municipality.

> *"The high demand in turn impacted the water resources in the city and particularly it impacted the groundwater" –* ***Expert (E11).***

GAMEP (2017) contends that the demand for water has increased in Riyadh and the rest of Saudi Arabia as the population increases. Social and economic development of Riyadh has further added to the increasing need for water resources. The increasing demand for water has however not been met by increased supply of water as more groundwater resources continue to face the threat of depletion. Equally affected by rapid urbanisation is Wadi Hanifa valley, which has been home to various groundwater resources. Muneerah (2015) notes that the use of groundwater resources in Wadi Hanifa has increased as more people continue to encroach in areas surrounding the valley. The issue of encroachment was one that was equally highlighted by one of the respondents (E20) who noted that there is a tendency of people encroaching on land that is meant for other purposes and that they do so in disregards of the need for environmental conservation.

> *"And then there is the fact that some of these projects encroach on land areas that are meant for other purposes. So then this is tied to the fact that they do not encourage environmental conservation and instead are increasing urban pollution"* – ***Expert (E20).***

In the case of Wadi Hanifa, environmental pollution has been one of the challenges afflicting it owing to poor garbage disposal methods. Abdallah (2017) reveals that part of the valley has been designated as dumping grounds, which have consequently altered the topographical make-up of Wadi Hanifa.

- *Land reclamation*

Another impact of rapid urbanisation on desert and arid land is land reclamation. Many of the respondents were of the view that the increasing demand for land to build residential and commercial properties had forced people to turn to desert and arid land. One of the respondents (E14) noted that land reclamation is not a practice that is exclusive to Riyadh but is also occurring in other parts of KSA.

> *"Not only in Riyadh but also in other parts of Saudi Arabia have we witnessed the conversion of arid land into areas for erecting buildings and other social facilities owing to the rapid urbanisation"* ***- Expert (E14)***.

It is not only buildings and other social facilities that have been symbolic of the reclamation efforts but also the planting of trees. Saudi Aramco is one organisation that has been at the forefront of land reclamation efforts in desert areas particularly in response to the increasing encroachment of sand on highways. For example, over 46,000 trees of various species have been planted beside the Abqaiq-Dharan Highway in the past decade (Aramco 2017). Subsequently, these efforts have ensured the safety of the company's employees as well as that of the community. The efforts of Aramco, in addition to other land reclamation efforts, have significantly changed the landscape of

desert and arid areas. This is a point well explained by one of the respondents (E7) who noted that these efforts have been happening in other parts of Saudi Arabia – and not only Riyadh.

> *"The impact of rapid urbanisation on Riyadh city is that the big change happened in the city during last decades, now the city changed from an arid and desert city into a place full of landscaping, trees and plants everywhere," – **Expert (E7)**.*

Wadi Hanifa valley – as aforementioned – represents a prime example of an area whose landscape has totally transformed due to the urban projects initiated by the local and central government. Thanks to the construction of a large sewage treatment plant, the valley has now become scenery of lakes that have become a tourist attraction.

6.3.6. Integration of sustainable urbanisation into the future development

The interviewees proposed various strategies that can be applied to integrate sustainable urbanisation into future development projects (See figures 6-15/6-16-1/6-16-2 for details).

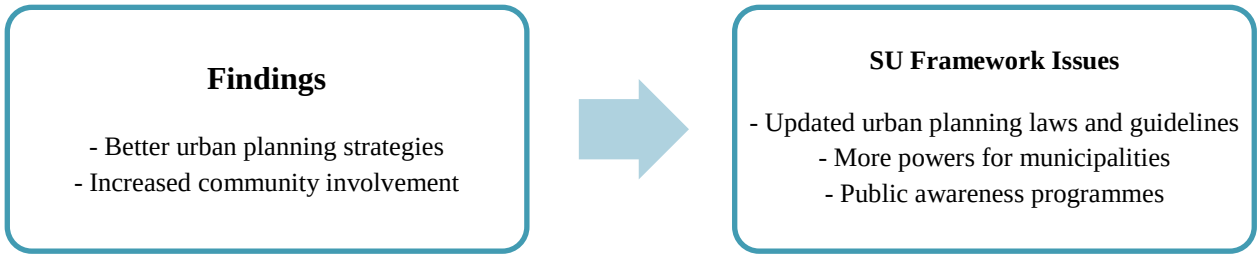


Figure 6-15: Interview process of urban planning officials/experts on integration of sustainable urbanisation into future development in KSA cities

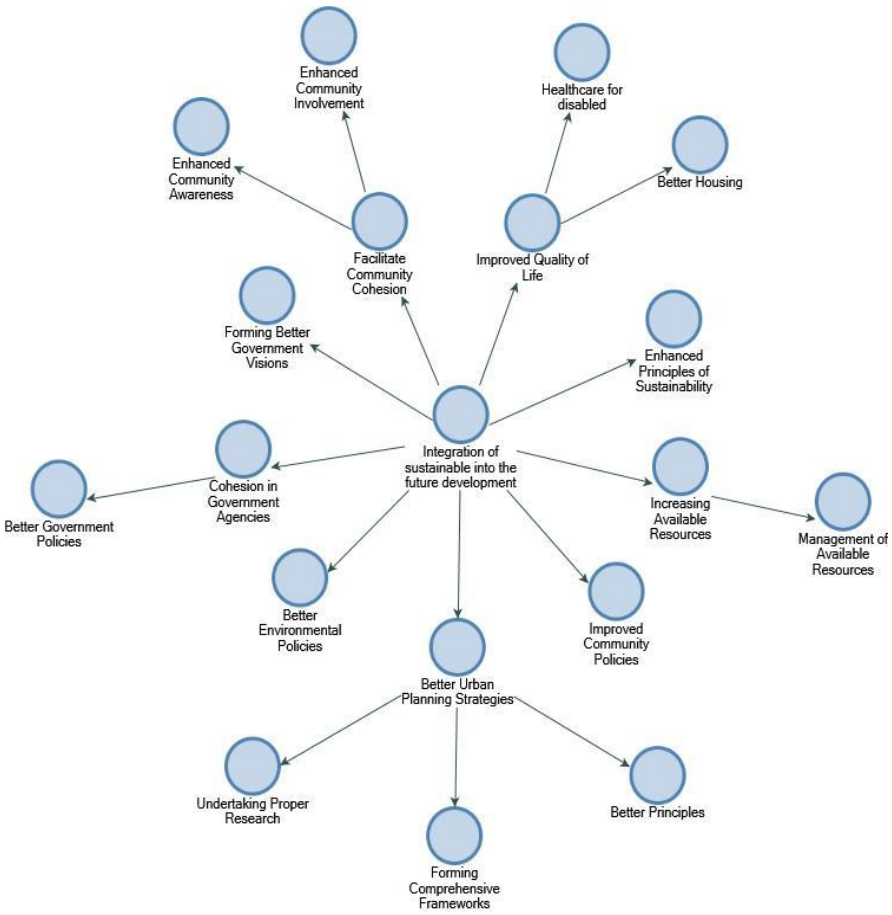


Figure 6-16-1: Relationships in Integration of sustainable into the Future Development

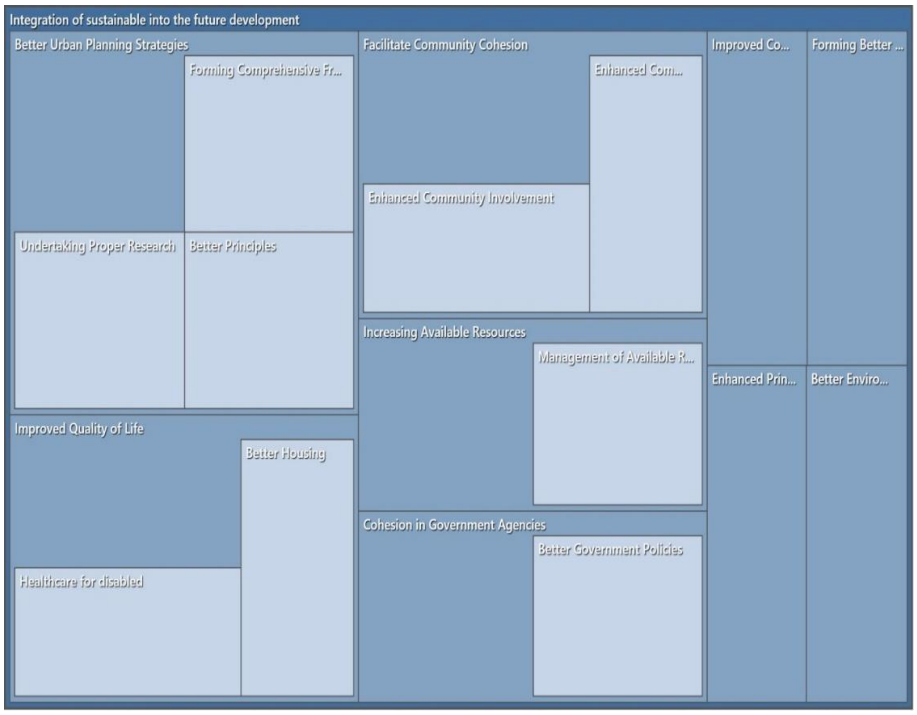


Figure 6-16-2: Hierarchy in Integration of sustainable into the Future Development

- *Better urban planning strategies*

Most of the experts interviewed noted that sustainable urbanisation can be integrated into future development projects through better urban planning strategies. On further probing, respondents mentioned the following aspects that should be catered for in urban planning: waste management, environmental management and public-private sector partnership. For instance, one of the respondents (E3) reiterated on the need for a framework that ensures that the city's environmental assets are safeguarded.

> *"Our city also requires an integrated and strong framework which can protect the environmental assets in the city as well as conserving the environmental factors, so that the city can keep up with the new environmental technologies and innovations," –* ***Expert (E3)***.

Similarly, various scholars have highlighted the need for a framework that ensures the protection of the kingdom's natural resources. Husain and Khalil (2013) propose that such a framework should encompass an interdisciplinary approach that combines human needs with environmental protection and economic development. The study further points out that social equity, economic growth and environmental conservation can be utilised as interrelated components in tackling the environmental challenges afflicting the kingdom. In a more recent study, Barichievy et al. (2018) admit that environmental conservation is a relatively new concept in the kingdom, which may experience implementation challenges despite the fact that a conservation strategy has been put to paper.

Another issue that many of the respondents felt should be included in an urban planning strategy is public-private sector partnerships. An example of such respondent with this view is the following (E16) who felt that it should be policymakers' top priority.

> *"I think the most important policy is the partnership between public and private sector to implement projects of urban development in the city" –* ***Expert (E16).***

The need for partnerships between the government and the private sector has been emphasised at various conferences by numerous experts. At the Saudi Urban Forum Conference in March 2016, participants were in consensus that such partnerships are integral in speeding up the process of sustainable urban development. However, these partnerships can only materialise when there are proper and flexible regulations that encourage private sector participation in urban development (UN-HABITAT 2016). Indeed, there are numerous benefits that Riyadh stands to receive if the concerned authorities pursue partnerships with the private sector. Private sector participation can subsequently reduce municipal budget deficits through extra funding, maintain much-needed

projects and accelerate economic development thereby providing many of the city residents with employment opportunities (UN-HABITAT 2017).

Riyadh's transformation from a traditional village to one of the megacities in the Middle East region is attributable to the oil boom that provided it with revenues for funding many of the projects in the municipality. However, there has been a chorus of calls for the kingdom to diversify its economy and reduce its dependence on oil. This was similarly one of the opinions of one of the respondents (E17).

> *"The best policies that the city can employ to improve sustainable living as well as to achieve sustainable urbanisation in its efforts geared towards becoming an economic power house in the Middle East as well as in the world are policies which support the development growth in the city, diversity the economic sources, income opportunities, employment and other economic factors" –* ***Expert (E17).***

- *Community involvement*

Respondents also emphasised on the need for community involvement as a way of integrating sustainable urbanisation into future development. Just like Riyadh residents, the experts interviewed consider citizen participation as a cornerstone of sustainable urbanisation. According to one of the respondents (E8), members of the public should be invited to provide ideas on formulation of policies.

> *"In my opinion, community involvement programs will be integral in development of urban areas. To achieve sustainable urbanisation, it is important that local communities be involved in the formulation of relevant policies by contributing their opinions on the same," –* ***Expert (E8).***

In his historical analysis of sustainable urbanisation in Riyadh, Garba (2004) notes that policies on urbanisation were simply developed at the higher echelons of the government and thereafter passed down for implementation. Many of these policies were not aligned to the realities at the grassroots and thus did not do much to cater to the needs of the people. Public participation – or rather, participatory governance – is a core part of the sustainable development goals (SDGs), which are guiding mechanisms for creating sustainable cities. UNDP (2016) outlines that participatory governance can improve social cohesion among city residents in addition to forestalling collusion, capture and influence of the political system by a select few. Furthermore, it can improve public service delivery by creating accountability.

6.4. Riyadh residents

A total of 30 interviews were conducted with 30 Riyadh residents spread across the five sub-municipalities of Al-Olayyah, Al-Ma'athar, Nemar, Al-Naseem and Al-Diriyah. Table 6-2 provides a profile of each of the residents.

Table 6-2: Profile of Riyadh residents interviewed for the main study

Resident (R)	Place of residence (sub-municipality)	Gender	Number of years living in Riyadh
R1	Al-Naseem	Male	12
R2	Nemar	Male	30
R3	Al-Diriyah	Female	22
R4	Al-Olayyah	Male	46
R5	Al-Ma'athar	Female	10
R6	Al-Diriyah	Male	55
R7	Nemar	Male	13
R8	Al-Naseem	Male	17
R9	Al-Ma'athar	Female	14
R10	Al-Olayyah	Male	15
R11	Nemar	Female	10
R12	Al-Olayyah	Female	20
R13	Al-Ma'athar	Male	11
R14	Al-Naseem	Male	19
R15	Al-Diriyah	Male	24
R16	Al-Diriyah	Female	16
R17	Nemar	Male	37
R18	Al-Naseem	Male	47
R19	Al-Ma'athar	Female	34
R20	Al-Olayyah	Male	40
R21	Nemar	Male	39
R22	Al-Naseem	Female	26
R23	Al-Olayyah	Male	15
R24	Al-Ma'athar	Female	18

R25	Al-Diriyah	Male	39
R26	Al-Ma'athar	Female	20
R27	Nemar	Male	47
R28	Al-Naseem	Female	9
R29	Al-Olayyah	Male	10
R30	Al-Dirriyah	Male	34

6.4.1. Drivers and Barriers of Sustainable Urbanisation

The purpose of the interviews with Riyadh residents was to identify the drivers and barriers of sustainable urbanisation in Riyadh according to their perceptions. Semi-structured interviews were employed on 30 Riyadh residents drawn from the following municipalities: Al-Olayyah, Nemar, Al-Ma'athar, Al-Naseem and Al-Diriyah. The interviews identified various barriers and drivers of sustainable urbanisation (See figures 6-18-1/6-18-2 for barriers details and figures 6-20-1/6-20-2 for drivers details).

6.4.1.1. Barriers

The barriers of sustainable urbanisation refer to the factors or issues that may hinder the adoption of sustainable urban practices by various stakeholders, including residents, government representatives and the private sector, among others (Figure 6-17).

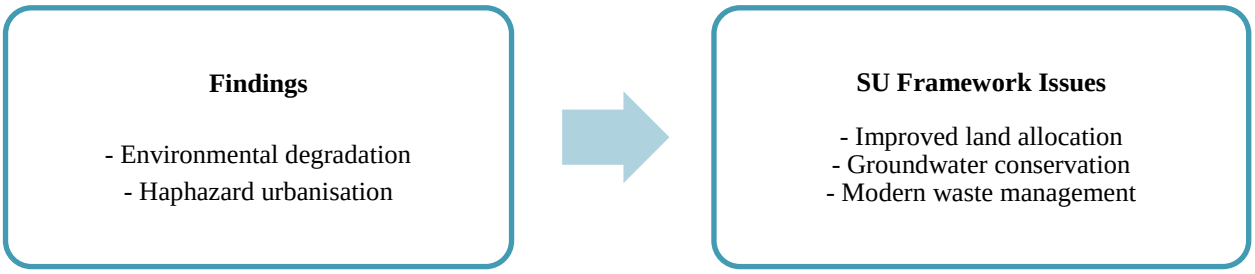


Figure 6-17: Interview process of Riyadh residents on barriers to sustainable urbanisation

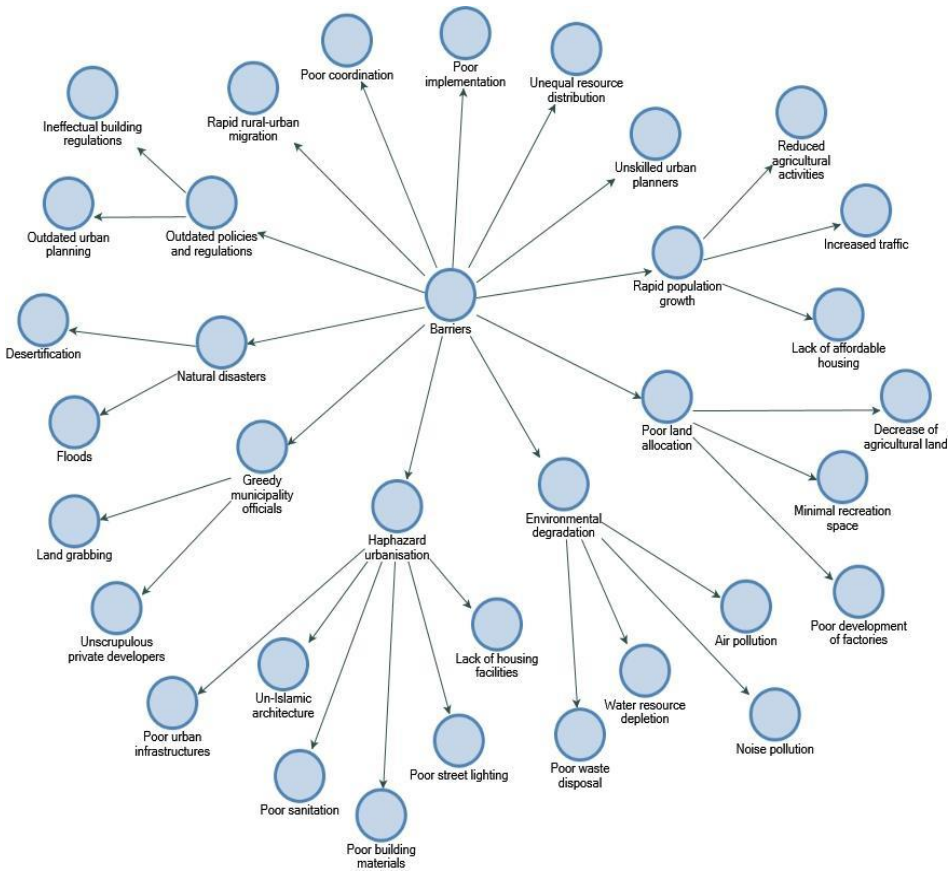


Figure 6-18-1: Barriers to Sustainable Urbanisation (Riyadh residents' perceptions)

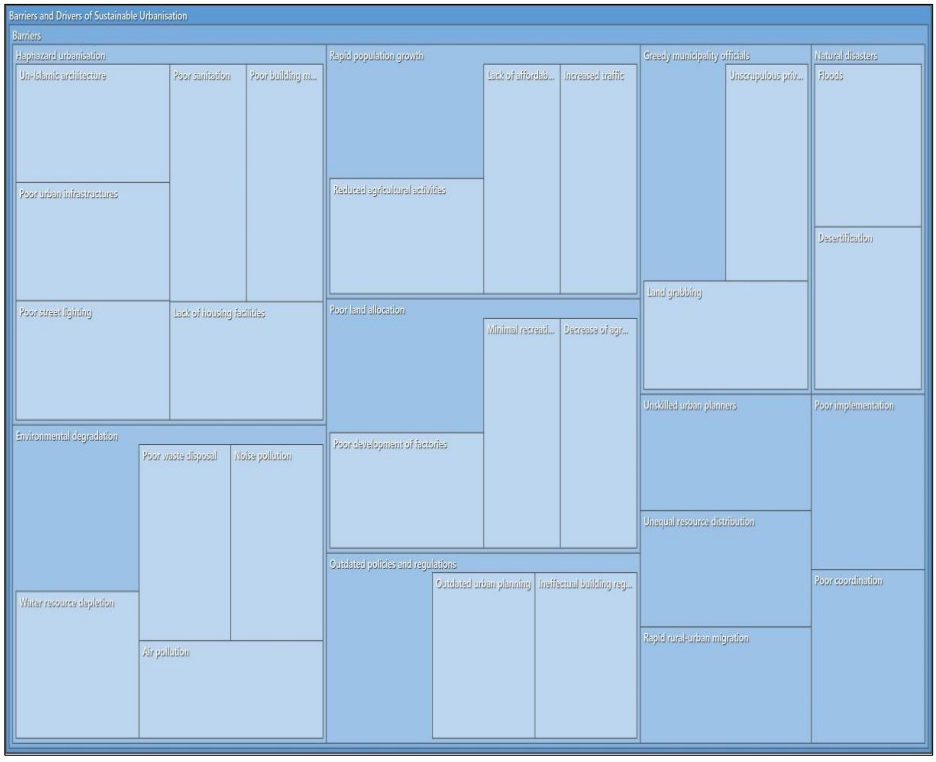


Figure 6-18-2: Hierarchy in theme barriers of sustainable urbanisation

- *Environmental degradation*

According to perceptions of most residents, environmental degradation is the main barrier to sustainable urbanisation in Riyadh. Majority of the residents interviewed bemoaned the increased rate of air pollution in the city as well as deplorable waste management. One such respondent (R18) attributed this state of the environment to industries and trucks in the Southern part of the city that are notorious for increasing emissions and noise pollution.

> *"The main pollution in the city is the air and noise which is caused by emissions from factories and trucks movement"* – **Riyadh resident (R18)**.

Indeed, various studies have highlighted the fact that Riyadh – and Saudi Arabia in general – is one of the leading cities when it comes to carbon emissions. Hajjar (2014) notes that 50% of the carbon emissions are attributable to the power and electricity sector whereas the transport and the industrial construction sector comes second. Alshehry (2015) adds that carbon emissions in Riyadh have increased by approximately 8.3 times from 1970-2012. This was by far higher than the overall global emissions that increased by an estimated 1.29 times within the same period. The fact that air pollution is attributable to the transport sector is confirmed by the sentiments of other residents interviewed for this study. For example, one of the residents (R23) blamed the increasing air pollution on the increasing number of cars on the roads.

> *"The air in our city is contaminated with a lot of smoke from the exhaust of various cars. These cars include trucks and personal cars, which have become very many in the recent past"* – **Riyadh resident (R23).**

Another respondent (R25) confirms Hajjar's (2015) assertion that the industrial and construction sector is a major contributor to increasing cases of CO2 emissions.

> *"If talk about air pollution, we have to talk about industrial uses across the city and the traffic movement and the logistics services in the south part of the city. I think that the industrial uses are the main pollutants of air pollution, especially cement factories and quarries which generate dust, and dust is one of the causes of asthma and respiratory system diseases in the city. Additionally, these industrial uses are the main source of smoke that emit from factories and pollute the air also,"* – **Riyadh resident (R25).**

Concerning poor waste disposal, a number of the respondents pointed fingers at the local authorities for their continued use of landfills, which may pose a threat in the not-so-distant future. An example is one of the respondents (R2) who noted that the landfills precipitate harmful gas emissions.

"Regarding the municipal waste, there is no recycling but there is a landfill. The future risks of these landfills are gas emissions and the best solution is using them as green areas," – **Riyadh resident (R2).**

This comment brings to fore Anjum et al. (2016) research paper in which they note that the primary means of waste disposal in Riyadh as well as in other cities is through landfill dumping and combustion. The researchers add that these methods of waste disposal are unhealthy and pose serious threats to the environment. Unless the waste is treated properly, these landfills may lead to pollution of surface waters and ground water as well as malodours (Anjum et al., 2016). Among many of the respondents, there was also the perception that the rapid population growth is responsible for the fact that local authorities are overwhelmed as far as waste disposal is concerned. For example, one of the respondents (R12) remarked that the amount of waste has increased as the population of Riyadh has increased.

"As the number of people in this city continues to increase, my observation is that the amount of waste disposed by the residents has increased" – **Riyadh resident (R12).**

This statement is in line with UNHABITAT's (2018) observation that the rapid urbanisation of Riyadh has orchestrated a set of challenges one of which includes solid waste management. The agency further notes that the increasing population growth has given municipal authorities a big headache as far as meeting the demands for services among Riyadh residents.

- *Haphazard urbanisation*

Some of the respondents also noted that the urban sprawl stands out as big impediment to sustainable urbanisation in Riyadh. Upon further probing, some of the interviewees stated that the continued use of poor building materials is a characteristic of haphazard urbanisation and that this will make sustainable urbanisation an impossible thing to achieve. An example of a resident who holds such a view is the following respondent (R17).

"The quality of building in cities is very low and quality is measured by the bad level of used building materials, and materials used finishing is very bad"- **Riyadh resident (R17).**

Another one of the respondents (R12) with this view noted that the use of poor building materials has mostly affected informal settlements where there is no privacy for different families.

"Here, there is no privacy because the houses are made of low-quality products while the sanitation facilities, such as toilets are wanting," – **Riyadh resident (R12).**

This sentiment is reflective of the view held by Garba (2004) who notes that the rapid urbanisation of Riyadh led to mushrooming of informal settlements that were mainly inhabited by impoverished migrants from the Arabian Peninsula. Apart from lacking privacy, these houses or informal settlements did not have gas, electricity, water or other amenities.

6.4.1.2. Drivers

The drivers of sustainable urbanisation refer to the factors and issues that may propagate the adoption of sustainable urban practices by the various stakeholders.

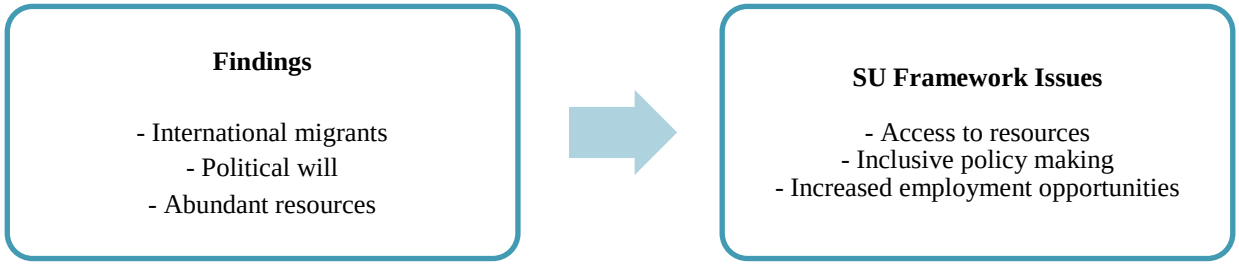


Figure 6-19: Interview process of Riyadh residents on drivers of sustainable urbanisation

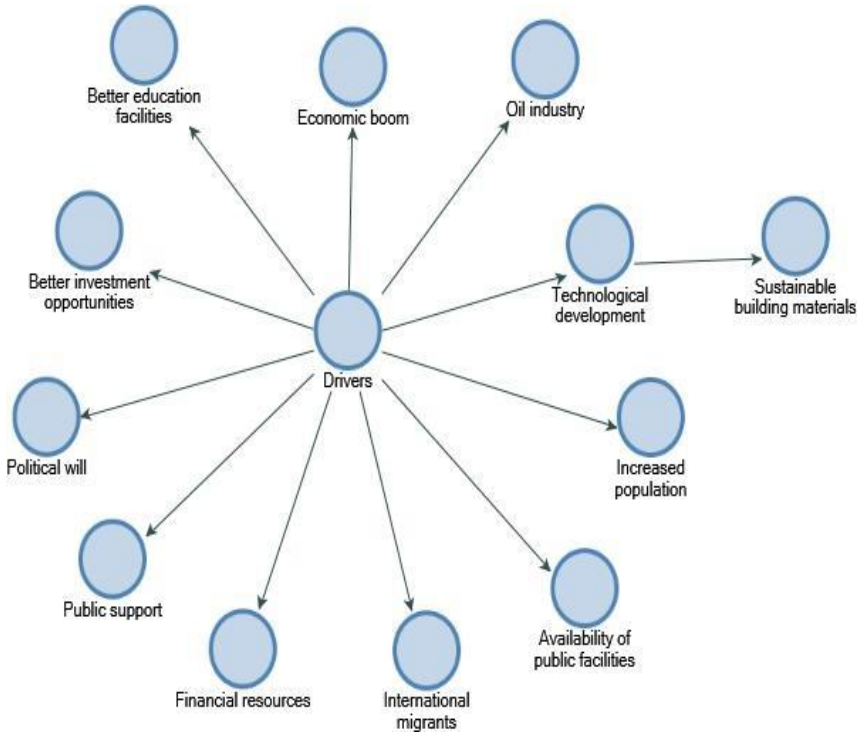


Figure 6-20-1: Drivers of sustainable urbanisation (Riyadh residents' perceptions)

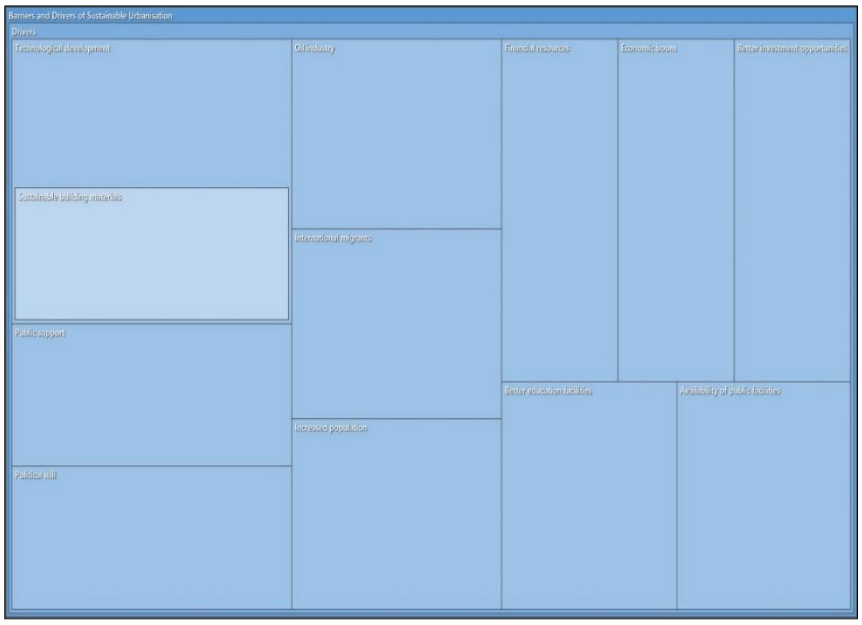


Figure 6-20-2: Hierarchy in theme drivers of sustainable urbanisation

- *Abundant resources*

According to the perceptions of many residents interviewed for this study, Saudi Arabia is endowed with natural resources, such as oil and natural gas, which will provide enough revenues to facilitate the sustainable urbanisation process. One of the residents (R1) reiterated on the importance of sufficient financial support for sustainable urban planning.

> *"We get a lot of money from oil and other resources, which we can use to make sustainable urban planning,"* – **Riyadh resident (R1).**

Much of the economic growth of the city is attributable to the oil boom that saw it transform from a simple town to one of the largest cities in the Middle East. According to Garba (2004), the oil boom in the 1970s-1990s spurred a massive development in Riyadh, which was characterised by rapid infrastructural development. During this period, the urbanisation rate was 8% per year as an influx of internal and international migrants occurred in search of job opportunities.

- *International migrants*

The influx of international migrants into Riyadh was also mentioned by many residents as a driver of sustainable urbanisation. These residents pointed out that the international migrants could be a source of important information and knowledge on sustainability practices. One such respondent (R15) pointed out that the local authorities can borrow a lot of great ideas from these immigrants with regards to sustainable urbanisation.

"The presence of many foreigners will also provide us with many ideas on how to create sustainable urban projects. The foreigners will provide us with ideas on how to create these kinds of projects" – **Riyadh resident (R15).**

Throughout its period of urbanisation, international firms have played a pivotal role. According to Garba (2004), one of these was the Greek-based Doxiadis Associates, which developed the first master plan to guide the urbanisation process from 1971-2000. Also involved was Indian firm Sarvajanik College of Engineering and Technology (SCET) that helped review the initial master plan developed by Doxiadis Associates.

- *Political will*

Residents interviewed for this study were also optimistic about the role played by political leaders in realisation of sustainable urbanisation. They noted that there is a political will to ensure that sustainable urbanisation beginning from the top levels of government. This optimism was epitomised by one of the respondents (R13).

"It is a good thing that the political leaders have woken up to the dangers of rapid urbanisation, such as pollution, and are now doing something about it. I have read stories of their meetings to try and find ways of improving the situation" – **Riyadh resident (R13).**

Political will for sustainable urbanisation have been witnessed beginning from the upper echelons of the royal family as evidenced by the Saudi Vision 2030 and the National Transformation Plan (NTP). In particular, His Royal Highness Prince Mohammed Bin Salman Al-Saud has exemplified this political will by seeking to divert the kingdom from its hitherto reliance on oil revenues. Al-Surf and Mostafa (2016) report that Prince Al-Saud declared during the launch of Saudi Vision 2030 that the country's economy would no longer be solely reliant on oil revenues but also diversify into human capital and private sector development.

6.4.2. Improving quality of life

The purpose of asking this question was to explore the ways in which sustainable urbanisation can improve the quality of life for Riyadh residents (Figure 6-21). From the semi-structured interviews conducted with the residents, the following issues were identified as the products of sustainable urbanisation (See figures 6-22-1/6-22-2 for details).

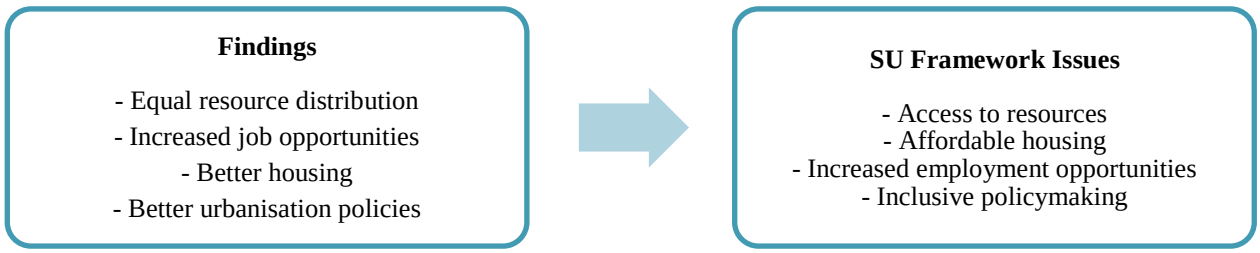


Figure 6-21: Interview process of Riyadh residents on improving quality of life

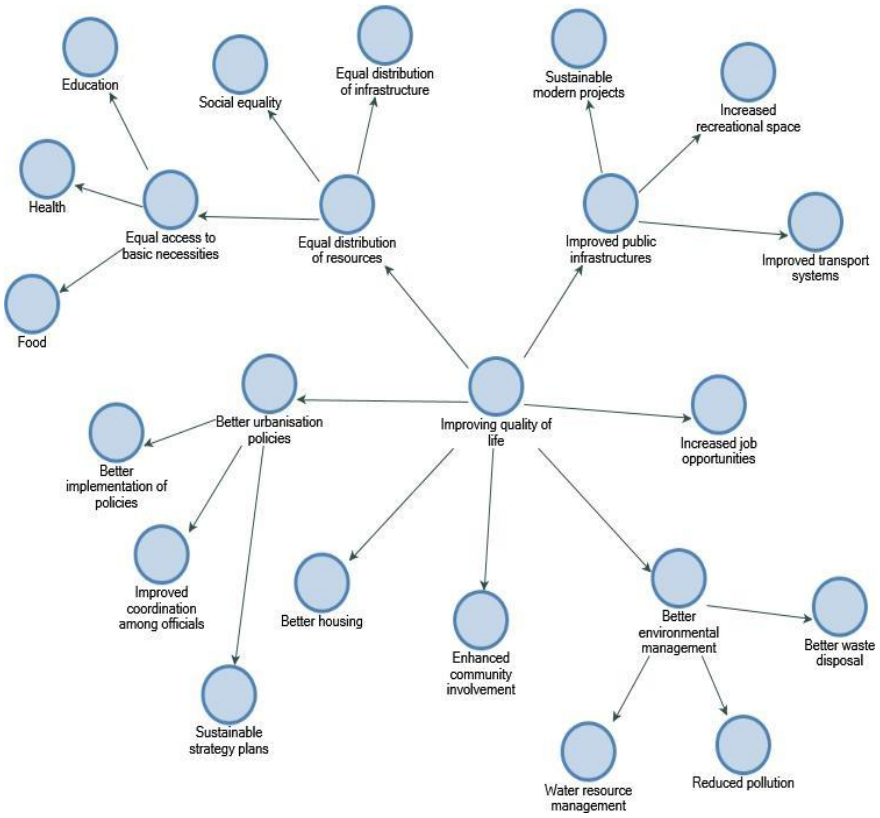


Figure 6-22-1: Relationships in theme Improving Quality of Life

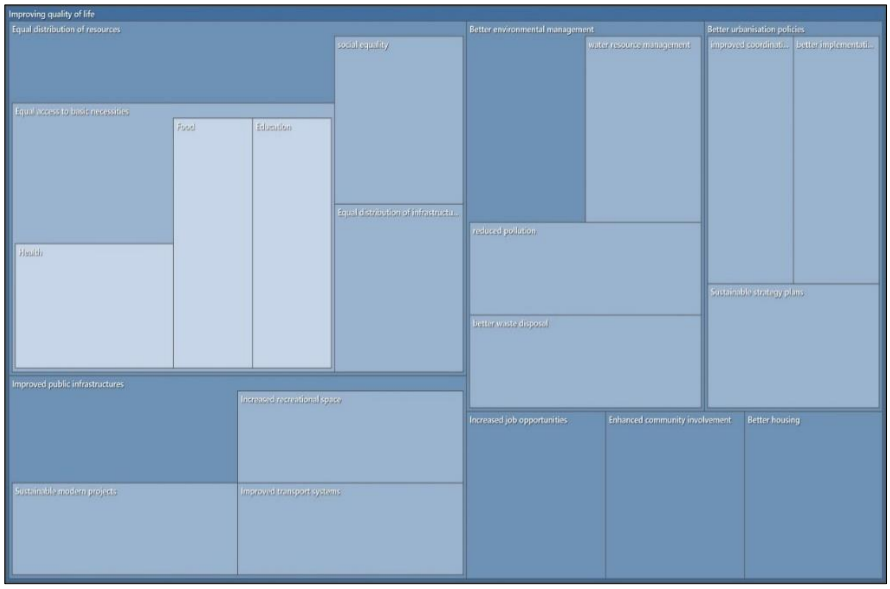


Figure 6-22-2: Hierarchy in theme Improving Quality of Life

- *Equal distribution of resources*

The dominant perception among most of the Riyadh residents interviewed for this study is that equitable distribution of resources is integral to improving the quality of life insofar as sustainable urbanisation is concerned. Their sentiments on the need for equal distribution of resources can be categorised into the following: equal access to basic necessities; social equality; and equal distribution of infrastructure. Regarding the need for equal access to basic necessities, the respondents noted that authorities should ensure that everyone has equal access to food, health and education. One of the respondents (R19) notes that many residents have suffered from inability to access health and educational services.

> *"We have to provide health and educational services as many residents suffer from insufficient services"* – **Riyadh resident (R19).**

Another one of the respondents (R23) narrows down to the young people who he notes that are in dire need of health and education needs without which they would not be able to access the other needs.

Another respondent (R30) does not mince his words in reiterating on the need for equal distribution of these resources.

> *"And finally, we have health and educational services which should be provided equally and fairly in Riyadh neighbourhoods"* – **Riyadh resident (R30).**

When it comes to social equality (or inequality), one of the core issues that emerges is that of gender inequality. Many studies and reports have been written in support or opposition to the assertion that Saudi Arabia promotes gender inequality that disadvantages women when it comes

to job opportunities, family law and other aspects of the Saudi society. Doumato (2010) for instance, notes that the Basic Law of the Kingdom of Saudi Arabia does not guarantee gender equality in favour of women. Alsaleh (2012) however differs with this perception noting that more women in the recent past have been afforded increased opportunities in politics, employment and education. He further notes that the notion that Saudi Arabia promotes gender inequality is a perpetration of Western scholars and activists who have no understanding that the perception of equality differs from country to country or culture to culture. The issue of gender inequality is one that cropped up several times during interviews with some of the Riyadh residents. One of the respondents (R26) proposed for a legislation to ensure that a certain percentage of all jobs go to women.

> *"Women have also been discriminated against when it comes to job opportunities because men are the most preferred. The government should decree that a certain percentage of jobs should be set aside for women"* – **Riyadh resident (R26).**

- *Better housing*

Many of the residents interviewed also noted that sustainable urbanisation can improve the quality of life through better and affordable housing. Susilawati and Al-Surf (2011) have decried the high cost of living as an impediment to development of sustainable housing methods. This statement is corroborated by one of the residents (R15) who emphasises the need for the authorities concerned to prioritize affordable housing for residents.

> *"The affordable housing is a top priority for Riyadh city residents. The government should provide well planned and designed affordable housing, then recreational space should provide, later we have to provide health and educational services, and finally we have to provide job opportunities"* – **Riyadh resident (R15).**

Some of the residents who talked about the need for affordable housing also pointed a finger at the rapid population growth in the municipality as the main cause of the increased prices of houses. A case in point is the following Riyadh resident who claimed that the increase in population has created a demand for housing, which in turn has increased the prices.

> *"This great population made the demand for affordable housing high; therefore, affordable housing is a top priority as I think"* – **Riyadh Resident (R18).**

In their presentation at the 17th Pacific Rim Real Estate Society Conference in 2011 in Gold Coast, Australia, Susilawati and Al-Surf (2011) note that Riyadh experienced a rapid population growth rate that overwhelmed the public authorities in providing adequate housing for the residents. This statement backs up the sentiment of the respondent who blames the rapid population growth rate

for the increasing prices of houses in the municipality. Furthermore, El Batran (2008) notes that Saudi Arabia – and Riyadh in particular – has witnessed an influx of international and internal migrants who have contributed to the increasing demand and subsequent shortfall of houses. Additionally, there has been an upsurge of economic activity in the urban centres as well as improved fertility rates resulting in more births (El Batran, 2008).

Apart from the need for affordable housing, many of the respondents who cited this need also mentioned the need for quality housing with facilities, such as water supply, electricity and sewerage facilities, among others. The following comment from one of the respondents (R22) captures the thoughts of those who reiterated on the need for quality housing:

> *"In my opinion, there is a lot that the municipality should do for us to improve our living standards. First of all, I have said that we need better houses that have enough water and electricity"* – **Riyadh resident (R22).**

Indeed, Susilawati et al. (2017) note that the rapid urbanisation has resulted in a rise in unplanned settlements in Riyadh – as well as in other urban centres in Saudi Arabia. Their observation is reflective of an earlier observation by AlSharif (2013) in which he notes that these unplanned settlements are characterised by lack of necessary infrastructure, schools, hospitals and sanitation facilities.

Furthermore, respondents who spoke of the need for quality housing to improve the quality of life blamed the high prices of land as a barrier to house ownership. One of the respondents (R27) proposed the creation of regulations to curtail the wanton increase in the prices of land.

> *"Local authorities in the city should support their citizens by finding new and effective methods and mechanisms to control prices of land plots and building materials in order that their citizens can own suitable and appropriate houses provided with the basic necessities and services"* – **Riyadh Resident (R27).**

This perception is corroborated by another resident (R25) who notes that the government ought to facilitate ownership of homes for residents who cannot afford them.

> *"The local government should facilitate ownership of houses for those residents because their limited salaries they can't shoulder the expenses of high prices of land and building materials"* – **Riyadh resident (R25).**

Indeed, AlSharif (2013) states that the urban land prices have proven to be pricey for many of the residents who resort to living in the unplanned settlements.

- *Increased job opportunities*

The issue of increased job opportunities – based on the interviews for this study – is core to many residents of Riyadh if sustainable urbanisation is to improve their lives. One of the respondents (R29) expressed hope that the sustainable urban policies would lead to more jobs for the youths, many of whom are qualified but are jobless.

> *"Somehow, these sustainable urban practices will also increase the number of jobs available to us because some of us have the paper but are jobless" –* ***Riyadh resident (R29)***.

This comment is indicative of the fact that the main issue is not that the unemployed youth lack the qualifications rather there is a lack of jobs. Al-Saud (2018) reveals that the number of high school graduates in Saudi Arabia increased from just over 23,000 to over 354,800 in 1970-1999. The author further notes that these educational developments occurred during the reign of King Faud when educational infrastructures were built to cover many cities and villages. In the majority of the respondents' comments regarding job opportunities, the dominant perception was that the government should prioritise creation of employment opportunities if sustainable urbanisation is to better the lives of Riyadh residents – most of who are the youth. One such respondent (R15) reiterated that prioritisation of employment opportunities was integral to the successful implementation of 2030 Vision and the National Transformation Program.

> *"I believe that the top priority for the government is to provide more job opportunities with good incomes for our youth in line with the localization policy included in 2030 Vision and the National Transformation programs which were declared in 2016. I think providing job opportunities are the first basic need of Riyadh residents" –* ***Riyadh resident (R15)***.

Indeed, there are many scholarly articles and reports that have proposed that the government should make the creation of employment opportunities its top priority. Al-Khateeb (2015) notes that the endemic and persistent youth unemployment is a ticking time bomb that may endanger the security of the entire kingdom by compelling the unemployed youth to engage in dangerous activities, such as terrorism and civil unrest. The lack of a job is a precursor to myriad other challenges that these youths experience in their lives. Some of the respondents – in advocating for the authorities to prioritize the creation of employment opportunities – added that having a job would help them offset other challenges afflicting them in their lives. An example is the following respondent (R23).

> *"Many young people you ask around will tell you that finding a job is a major worry for them. Finding a reliable source of income can help tackle the other issues, such as health and educational services" –* ***Riyadh resident (R23)***.

Another respondent (R29) similarly noted that having a job would be a solution to resolving the income inequalities that are prevalent in the city and even resolve the issue of affordable housing.

"Once we have enough job opportunities, we will be able to afford better health and education. If I have a better-paying job, I will also afford recreational space and affordable home. It is too bad that that is not the situation as per now" – ***Riyadh resident (R29).***

Al-Saud (2018) seems to corroborate the above sentiments when he notes that the increasing reliance of Saudi Arabia on foreign labour has accelerated unemployment levels among locals, which has subsequently led these unemployed youths into poverty. Even if the government were to prioritize job creation for the youth – as suggested by a majority of the respondents – where would these jobs come from? The perception among most of the respondents was that these jobs would come from the various projects to be undertaken in Riyadh as far as sustainable urbanisation is concerned. An example is the following comment by one of the respondents (R9) who notes that there are a lot of mega projects in the city, which could do with a lot of labour from the locals.

"Local authorities in Riyadh city which is considered as a great employment center across the kingdom, should invest in our big number of human resources in the city and recruit them in their mega urban development projects" – ***Riyadh resident (R9).***

For this to happen, it would mean that the local authorities would have to reduce their reliance on foreign labour in undertaking development projects. Al-Saud (2018) reveals that many of the development projects in the municipality have made use of foreign labour whereas the locals are ignored under the guise of being unqualified for the job.

- *Better urbanisation policies*

Most of the residents interviewed also stated that sustainable urbanisation can improve the quality of life through better urbanisation policies. The residents noted that such policies can lay the groundwork for the adoption of sustainable urban practices and consequently improve the quality of life for the residents. One of the respondents in particular (R11) proposed that better urbanisation policies should have clear roles for the different stakeholders involved in urban planning and implementation.

"Like I said before, the problem with our municipality is that it does not understand its specific roles. I think it is because they do not understand how to interpret the policies passed by the ministry. So, they apply these policies in a bad way. I suggest that the municipal council should educate their workers on good urban planning to avoid these problems that we currently face" – ***Riyadh resident (R11).***

Poor implementation of policies has been one of the challenges affecting urban planning in Riyadh as well as other major cities in the kingdom. This poor implementation is attributable to the lack of trained planners at the national, regional and local planners who are knowledgeable in the modern methods of urban planning (Future Saudi Cities Programme 2016). Coordination between these three tiers of governance has also been weak leading to the formulation of rigid policies that are developed by the central government with minimal participation of or engagement from local stakeholders. This has culminated in the development of urban planning policies that are not resonating with the changing landscape or needs of the public at the grassroots. One of the respondents (R24) decries the fact that poor coordination between the different urban planning agencies has hampered the implementation of urban planning policies.

> *"Even though the stakeholders are trying their best to come up with effective policies to improve living standards, the greatest problem is how to implement these policies. Like last year, there were plans to upgrade various slums in the city. However, plan still remains a pipe dream because there is uncertainty over who will perform which role and so forth,"* – ***Riyadh resident (R24).***

Indeed, developing better urbanisation policies would mean nothing if there is poor coordination among the three tiers of governance as well as with the respective stakeholders on urban planning. Bajaber (2017) notes that poor coordination among the urban planning officials has hampered urban management, leading to an unbalanced Riyadh. One of the residents (R12) interviewed went further and bemoaned how each of the agencies is often carrying out its responsibilities without due regard for the others.

> *"After they pass policies on improving standards of living, you will find that these authorities are confused on how to implement these policies. They do not cooperate with one another and you find that everyone carries out responsibilities according to his or her own interpretations"* – ***Riyadh resident (R12).***

Likewise, Bajaber (2017) points out that the institutional structure insofar as sustainable urban planning is concerned is jumbled up and characterised by overlapping functions and activities among the various agencies. It is commonplace to find that the agency tasked with overseeing the planning of the city is working independently of the one charged with implementation of the subsequent plans. According to another respondent (R2), sustainable urbanisation can only enhance the quality of life for Riyadh residents if this improved coordination not only involves government agencies but also the community at large.

"From my point of view, if we want to achieve proper quality of life, we should facilitate the coordination and cooperation between agencies and departments of public and private sectors as well as involving the community members through meetings and public hearings" – ***Riyadh resident (R2).***

A SWOT analysis of the planning issues in Saudi Arabia indicates that one of the main weaknesses is the lack of community involvement in urban planning processes. The urban planning process, including policy formulation, does not engage all the stakeholders who will be eventually impacted by these processes (Future Saudi Cities Programme 2016). The private sector is another group of stakeholders who have not been adequately involved in the urban planning process and implementation. Consequently, private sector investment has not occurred at the pace that would be expected to help improve the outlook of Riyadh (Al-Khateeb 2015).

6.4.3. Social, historical and environmental factors affecting sustainable urbanisation

The respondents (Riyadh residents) were interviewed on their perceptions regarding the social, historical and environmental factors influencing sustainable urbanisation in Riyadh (See figures 6-26-1/6-26-2 for details) on the factors identified during the interviews with the residents). The questions sought to understand whether the residents perceive these factors negatively or positively with regards to a healthy urban environment and sustainable communities.

6.4.3.1. Environmental factors

Figure 6-23 provides an explanation of the interview process on the environmental factors affecting sustainable urbanisation as far as Riyadh residents are concerned.

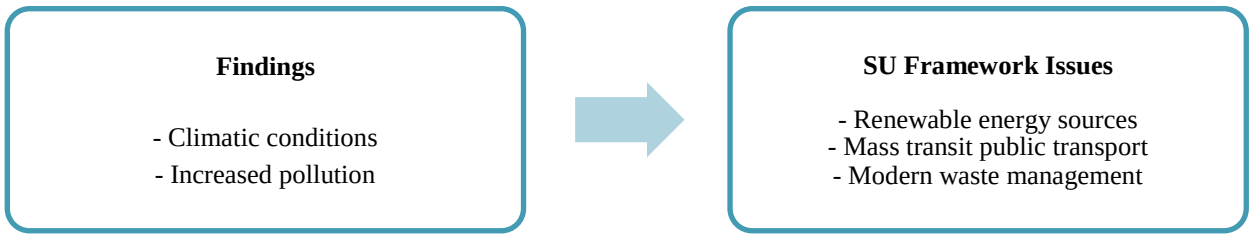


Figure 6-23: Interview process of Riyadh residents on environmental factors affecting sustainable urbanisation

- *Climatic conditions*

Most of the residents interviewed identified the arid and semi-arid climate of Saudi Arabia as the number one environmental factor that will affect sustainable urbanisation. When probed further, the residents pointed out that any sustainable practices should consider that the weather in Riyadh is hot with the rainy season occurring in March-April. One of the respondents (R7) blamed the

increasing traffic for the decreasing rainfall as well as the drought that has occurred in the last decade.

> *"Due to the high traffic movement in Riyadh city, we have environmental pollution and this in turn led to the decrease in rainfall in the city, and the city suffers from draught during last decade. Moreover, urban development projects led to some blocks in flood drainage channels and this caused very critical flooding events in the city in the last decades" – Riyadh resident (R7).*

The huge traffic on the roads is indicative of the increased car ownership in Riyadh, which results in the increase of carbon emissions into the atmosphere. Consequently, a 2015 study identifies a direct link between increased domestic consumption of oil and carbon emissions in Saudi Arabia. The study concludes that carbon emissions – and by extension, increased domestic consumption – is responsible for the degradation of the air quality in Riyadh and other cities of Saudi Arabia (Alkhathlan and Javid 2015). Climate change was another environmental factor that many residents perceived as influential on sustainable urbanisation. One such respondent (R17) with this view observed that temperatures in the municipality have become exceedingly high.

> *"Our climate has changed, and temperature became very hot during summer season and very cool during winter season, and in some seasons we have snow in the northern part of the kingdom," – Riyadh resident (R17).*

Apart from the world over, climate change is an issue that has featured at higher levels of government as far as environmental conservation in KSA is concerned. GAMEP (2017) admits that land use in the kingdom has been threatened by global warming in that there has been a rise in temperatures and decrease in rainfall.

- *Increased pollution*

Many of the respondents who spoke about increased pollution attributed it to the rapid population growth rate that has propagated an increase of cars on the roads. This has in turn increased air pollution through emission of harmful gases. One of the respondents (R3) notes with nostalgia that the air quality in Riyadh used to be better than it is currently.

> *"Environmentally, people of Riyadh used to breathe fresh air due to lack of vehicles in the past and the natural and healthy life they used to live, but currently, Riyadh became as a big garage which is full of all types and models of cars and this increased number of cars polluted the air and increased temperatures in the city" – Riyadh resident (R3).*

One of the reasons attributed to the increased ownership of cars is the lack of a walkability culture among residents. The harsh weather conditions have discouraged many residents from adopting walkability culture and instead prefer to move from place to place using their private cars. As the incomes of many people improve, many of them have resorted to purchasing their own cars, which has subsequently resulted in a lot of cars on the roads (Alkhathlan and Javid 2015). This has been further compounded by the lack of regulations to restrict the number of cars on the road. Thus, there is need for regulations to restrict the number of small cars on the roads as well as dilapidated vehicles (GAMEP 2017). This would contribute significantly towards reducing the emission of air pollutants, noise pollution and fuel consumption.

Some of the respondents went as far as mentioning some of the areas in the city that are notorious for air pollution. One such respondent (R18) pointed an accusing finger at the southern part of the city as a notorious area for increased air pollution due to the presence of many industries in that area.

> *"The main reason of this poor quality is the air pollution widespread across the city and mainly in the south part of the city. There are many causes for air pollution such as Yamana Cement Factory, quarries, warehouses and other industrial activities. Also air pollution is caused by the heavy truck movement within the city in addition to logistic services provided in the city" – Riyadh resident (R18).*

Considering that it is an epicentre of traffic and industrial activities, it is inevitable that Riyadh will be susceptible to environmental pollution as attested to by a 2014 study. The findings reveal toxic proportions of heavy metals in leguminous crops growing the city as a result of emissions from vehicles and industries (Alyemeni and Almohisen 2014).

6.4.3.2. Historical factors

Respondents were also interviewed on how the history of Riyadh city would affect sustainable urbanisation in the city (Figure 6-24).

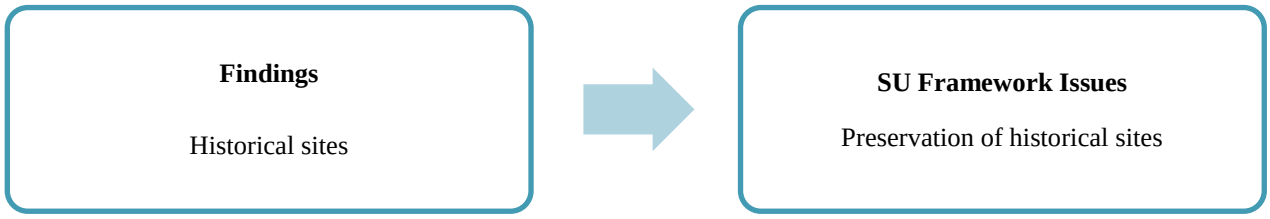


Figure 6-24: Interview process of Riyadh residents on historical factors affecting sustainable urbanisation

- *Historical sites*

Just like government experts and researchers, many residents held the view that sustainable urbanisation may have to copy the old architectures that were developed in line with the Islamic

culture. One of the respondents (R3) reiterates on the need to maintain the traditional villages as part of Riyadh's heritage.

> *"Our culture is one thing that should be considered when building new structures in the name of sustainable urbanization. I like the fact that the governor decided that the traditional villages would be maintained as part of our city's heritage" –* ***Riyadh resident (R3).***

The need to construct sustainable housing structures in conformity with the Islamic architecture has been a subject of focus in many forums as well as research papers. Al-Surf et al. (2013) point out that Islamic architecture should be integrated into sustainable housing projects and that it would be unfair to disregard the need to construct houses that reflect the Islamic culture as has been in the past. However, the trend in the construction industry of Riyadh has leaned more towards the Western styles as compared to the Islamic/Arabic culture. Unlike the past, today's housing structures, such as villas, have been constructed in such a way that the space between neighbours is further from each other in a bid to enhance privacy. One of the respondents (R7) confirms that indeed the landscape of Riyadh has changed insofar as the type of buildings is concerned.

> *"Historically, old Riyadh was distinguished by its mud buildings which were widely spread across the city, but due the urban development occurred in the city these mud buildings and houses disappeared totally," –* ***Riyadh resident (R7)***.

The story of Riyadh is one of a massive transformation aided by the oil boom that occurred half a century ago. Choguill (2008) marvels at the transformation of the city from an Arab village with mud dwellings to one of the rapidly growing cities in the world as well as in the Gulf region.

6.4.3.3. Social factors

Respondents were interviewed on the social issues affecting sustainable urbanisation to which they identified several issues (Figure 6-25).

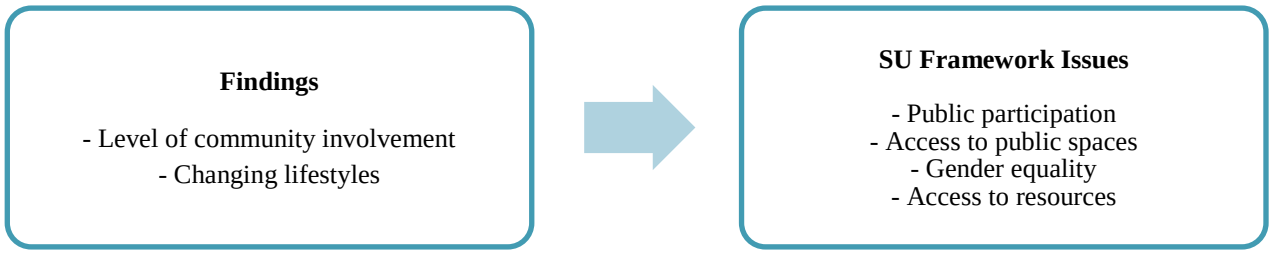


Figure 6-25: Interview process of Riyadh residents on social factors affecting sustainable urbanisation

- *Community involvement*

Most of the respondents were of the opinion that community involvement is the main social factor that will impact sustainable urbanization. The respondents noted that they could help the government – both central and local – in fulfilling some of its obligations, including environmental management, waste disposal and supervision of the building codes. One of the respondents (R8) bemoaned the practice of dumping waste in the desert and proposed that the government first needs to educate the public on the need for recycling.

> *"I have also read of stories about people dumping waste in the deserts. This is unfortunate and preventable if we all play our part in proper waste management. The government should educate us on the importance of recycling. Personally, in my own home, there are certain materials that I do not dispose of because their uses are done" –* ***Riyadh resident (R8).***

Perhaps, in an answer to the aforementioned suggestion by the respondent, the Sustainable Development National Strategy of Saudi Arabia (2005-2009) is an example of a programme that seeks to educate the public regarding environmental conservation. One of its main activities includes environmental awareness programmes that seek to inculcate a new culture in the public insofar as waste disposal and use of energy efficient systems are concerned.

Another of the respondents (R7) believes public participation in various sustainable urban planning processes will be integral to the success of sustainable urbanization in relation to the environment.

> *"We have to ensure environmental conservation through public participation by assigning responsibilities to the community. The community should participate in making decisions, developing programs, policies and regulations" –* ***Riyadh resident (R7).***

Alqahtany et al. (2014) note that one of the most important elements in a sustainable urbanization framework is an inclusive community that is involved in the running of the affairs of the municipality. This is something that has been lacking in the municipality where there has been a lack of coordination between the municipality authorities and the citizens. Garba (2004) notes that many of the policies formulated have nothing to do with the needs of the people at the grassroots. Based on the state of affairs, this low level of community involvement will hamper efforts to entrench sustainable urbanization practices.

- *Changing lifestyles*

Many of the respondents also highlighted the changing lifestyles of Riyadh residents as another major social factor that will influence sustainable urbanization. They were of the opinion that the

adoption of sustainable urban practices or projects must be cognizant of the lifestyles of the residents of the city. One of the respondents (R3) notes that many families in the city have encountered changes in their living arrangements.

> *"Socially, things have changed from the way they used to be when I was still a child. Back then, families used to live together for a long time. Today, people move out of their families as soon as they become married or older to go start their own homes"*- ***Riyadh resident (R3).***

Similarly, Susilawati and Al-Surf (2011) note that in many families, the tendency is for the youth to move out and establish their homes away from their nuclear families. To an extent, this change in lifestyle has led to an increased demand for housing and a shortfall in housing. Another lifestyle change that many respondents mentioned was the increasing dependence on cars and shunning of walkability. One of the respondents (R16) expressed fears about this current affair and its impact on the transport infrastructure.

> *"It's worrying because more and more people are buying cars every day in addition to the public transport that is already on the roads"* – ***Riyadh resident (R16)***.

The increase in cars is attributable to the oil boom that has made fuel cheaper in addition to the removal of tax levied on cars. This has encouraged many people to buy cars and spare themselves the hassle of walking. One lifestyle characteristic that will not change easily is public transportation. One of the respondents (R3) notes that it is an issue that will face cultural challenges.

> *"The use of public transportation may also be a problem considering that men and women do not mingle that easily in social places. It may bring up issues such as morality or public decency"* – ***Riyadh resident (R3)***.

Alotaibi (2017) notes that the high preference for privacy may be a cultural factor that can impede adoption of public transportation by most residents. This is highly likely for women who may prefer the use of private cars to avoid stirring conversations about public decency occasioned by the mixing of men and women in public places.

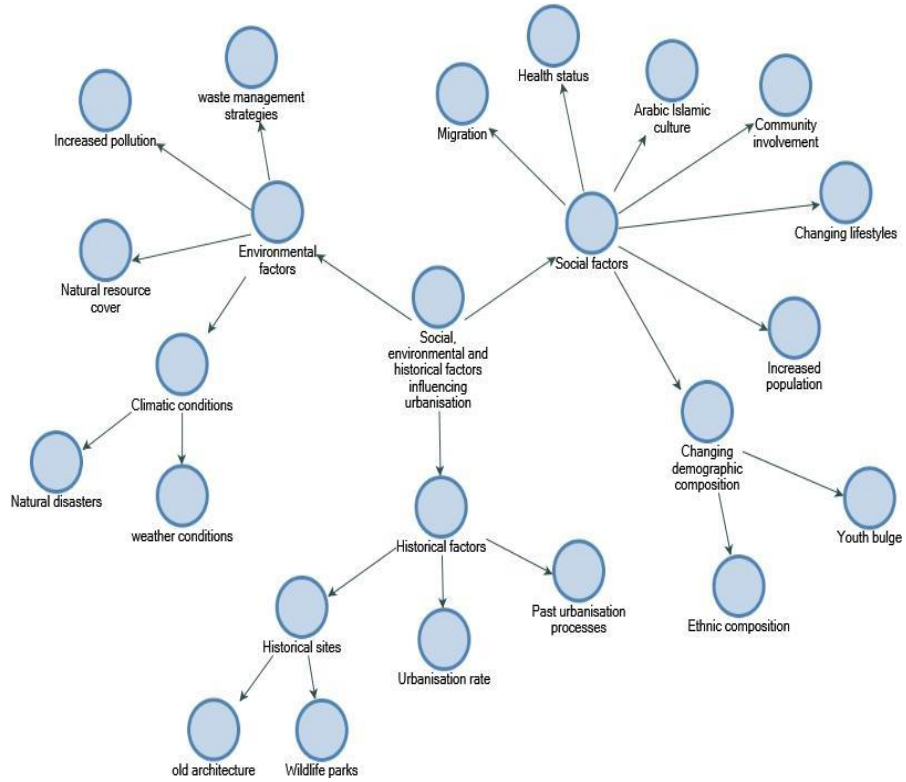


Figure 6-26-1: Relationships in theme Social, Environmental and Historical Factors

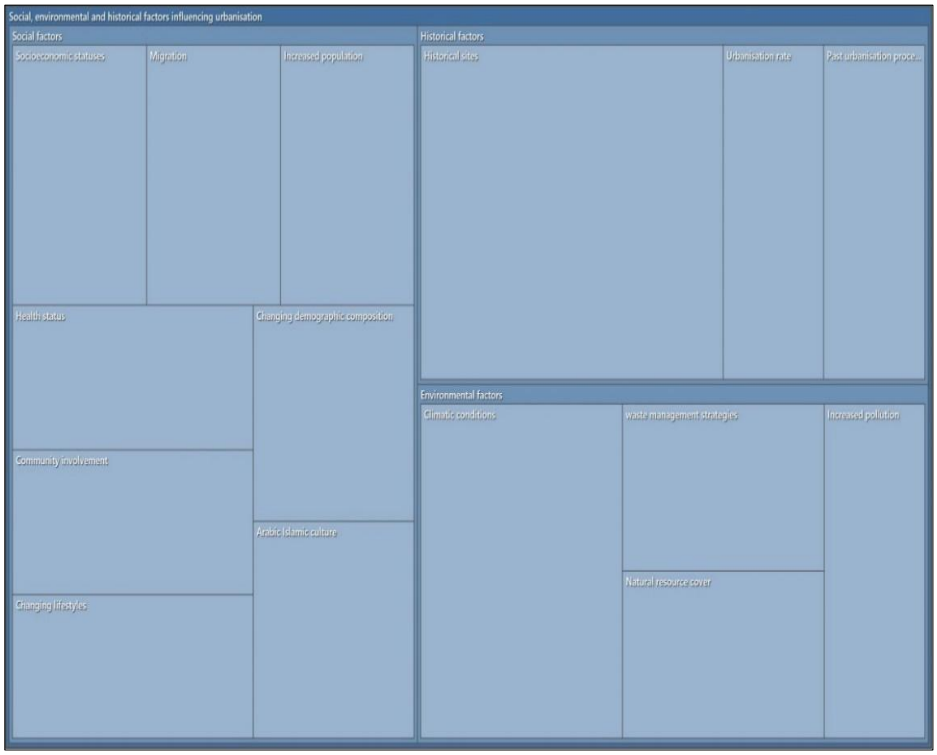


Figure 6-26-2: Hierarchy in theme Social, Environmental and Historical Factors

6.4.4. Impact of rapid urbanisation on desert and arid land

The respondents were interviewed on their perceptions of how rapid urbanisation has impacted desert and arid land in Riyadh (See figures 6-27/6-28-1/6-28-2 for the impacts identified). According to residents' comments, the following impacts were identified.

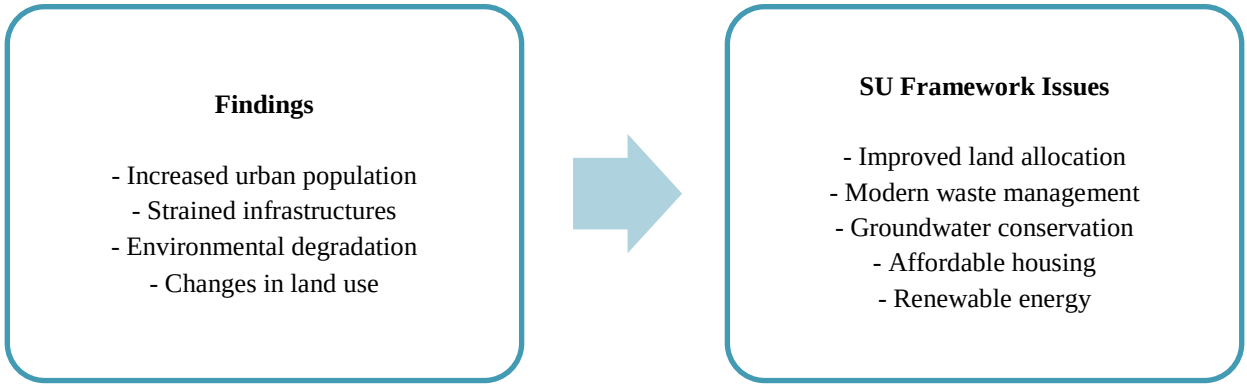


Figure 6-27: Interview process of Riyadh residents on the impact of rapid urbanisation on desert and arid lands

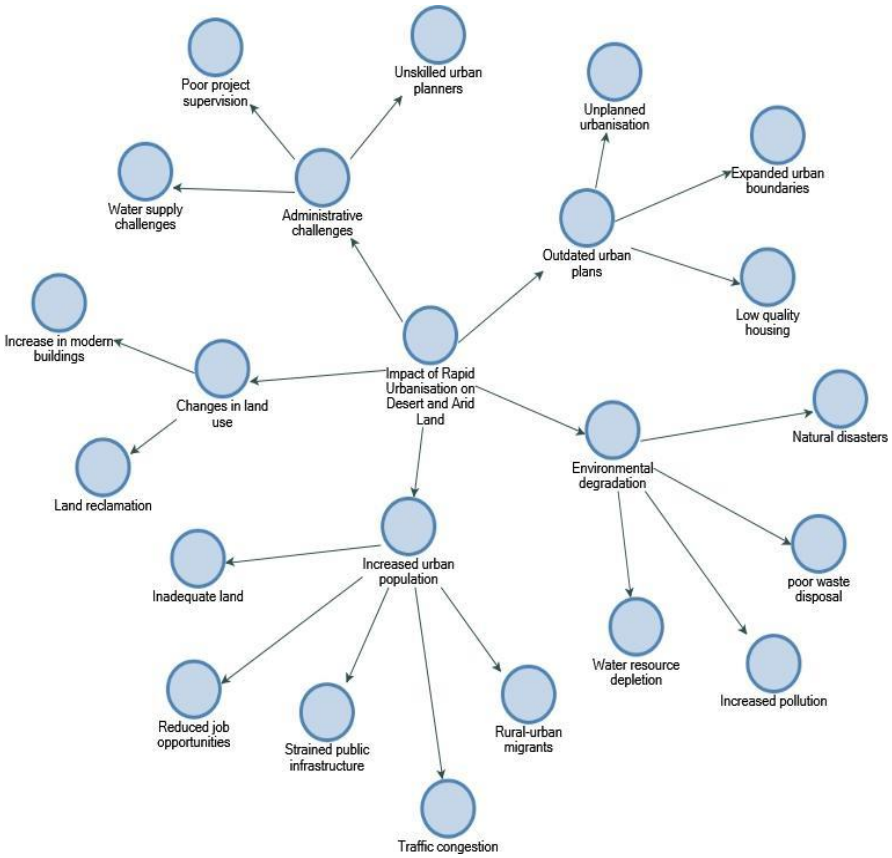


Figure 6-28-1: Relationships in theme Impact of Rapid Urbanisation on Arid Land

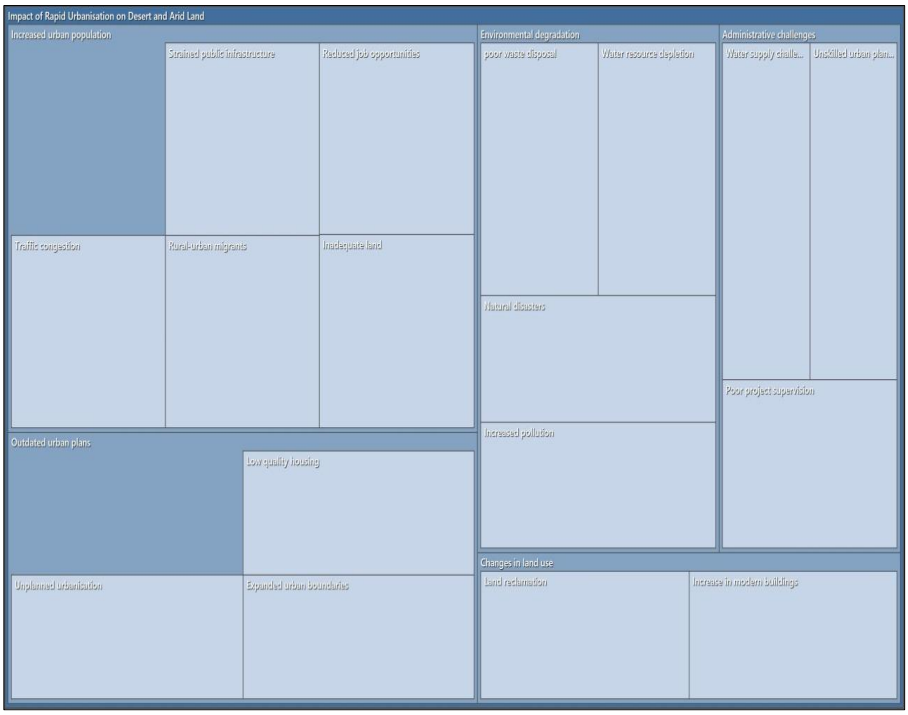


Figure 6-28-2: Hierarchy in theme Impact of Rapid Urbanisation on Arid Land

- *Increased urban population*

Most of the residents noted that rapid urbanisation has resulted in increased urban population on desert and arid lands. Upon further probing, the respondents noted a link between the increased urban population and the increasing traffic congestion on the roads. They pointed to the persistent traffic congestion as a sign that the municipality is experiencing population pressure. One respondent (R11) – for example – pointed out that traffic jams have become the norm for him especially when going to work.

> *"Traffic jams are a common thing I face when going to work. When I am in the jam, I also have to bear with the excessive noise from the hooting cars and people shouting. All these problems started as more people began to migrate to this place, which has raised congestion everywhere including in the streets when walking," – Riyadh resident (R11).*

The issue of traffic congestion seems to be a problem that has not been lost to various scholars who have highlighted it in their research papers. For example, Alotaibi (2017) reports that the traffic congestion has been a major cause of increasing incidences of road accidents in Riyadh. These accidents – apart from causing the loss of lives – have resulted in huge financial losses. As at 2016, the kingdom was losing approximately $3.6 billion per year because of road accidents (Ramisetty-Mikler and Almakadma 2016). The respondent also mentions that the reason for the increased population – and by extension, increased traffic congestion – is the rampant migration

into the city by internal and international migrants. Part of the reason for Riyadh's transformation from a traditional Arab village into a megacity in the Gulf region is the internal and international migration. Along with Jeddah and the holy city of Mecca, Riyadh has attracted a large number of internal migrants from rural areas in Saudi Arabia who are attracted to these urban centres by the perceived employment opportunities and modern facilities (GAMEP 2017). Regarding international migration, Riyadh has been a host of expatriates from various countries who work with many international organisations that have set up shop in the city.

- *Strained public infrastructures*

Another impact of rapid urbanisation as identified by the respondents is straining of public infrastructures. As the population of the city bulges, the demand for public services and infrastructure has outpaced the supply of the same. Consequently, not all residents of Riyadh have been able to access these services and infrastructure. According to one of the respondents (R22), the distribution of public infrastructures has been skewed in favour of a certain part of the municipality whereas those residing in the informal settlements have to make do with inadequate public facilities.

> *"Poor infrastructure that does not even need a lot of explanation. Look at the infrastructure we have here in the slums and compare it to other places"*- ***Riyadh resident (R22).***

UNDP (2016) warns that spatial inequality may negatively impact social cohesion within a city by creating social inequality. On the basis of this warning, there is clearly a need for Riyadh to ensure equal distribution of resources to ensure that all residents can enjoy a standard of living that they deserve. The road network is an example of an infrastructure that has been strained by the increasing urban population of which a significant number own cars. One of the respondents (R6) notes that the increasing population has resulted in the construction of big commercial shops along highways, which has subsequently prevented the construction of walkability corridors.

> *"Our city suffers from three main matters as a result of increased population? These three matters are crowded roads, big commercial shops along highways, and we have no walkability corridors within neighbourhoods," –* ***Riyadh resident (R6)***.

The respondent is not wrong to decry the fact that Riyadh performs poorly in walkability. Ledraa (2015) points out that the government has prioritised the construction of road networks to accommodate the increasing car population. This has been done at the expense of walkability corridors; the few that are there are part of the old neighbourhoods that were constructed before the city was caught up in rapid urbanisation.

- *Environmental degradation*

After increased urban population, many respondents felt that the second major impact of rapid urbanisation on desert and arid land is environmental degradation. On further probing, many respondents noted that one major form of environmental degradation has been water resource depletion. For instance, one of the respondents (R5) warned that rapid urbanisation may make it difficult for desert cities to achieve sustainable urbanisation. He further noted that this would mean the depletion of water resources that are found in the desert areas.

> *"I believe that rapid growth may impact desert cities, make them unable to achieve successful sustainable urbanisation and sustainability. Additionally, this sort of growth may also drain water, energy and natural resources found in desert and arid areas because the demand for these factors will be high and increase accordingly," – Riyadh resident (R5).*

That Riyadh suffers from water scarcity should not come as a surprise considering that it is a desert city. As a result, the municipality relies on the continuous use of groundwater because the surface water available is inadequate for drinking or irrigation (GAMEP 2017). However, the groundwater levels are at the risk of depletion because of the rapid population growth. Rapid urbanisation is directly linked to the increased demand for and consumption of water.

Another major form of environmental degradation – according to respondents – is increased pollution. One of the respondents (R14) notes that the increase of environmental pollution is something that has even been highlighted by international agencies, such as the United Nations (UN).

> *"Actually, even the UN has warned that Riyadh is becoming increasingly polluted with release of nitrogen dioxide and sulphur dioxide into the air. When you go to some low-class areas, you have to cope with cars spraying exhaust fumes nearby as they pass you. In the markets, there is a lot of shouting. Your ears are never at rest" –* ***Riyadh resident (R14).***

The fact that pollution has increased in Riyadh is best exemplified in the case of Wadi Hanifa valley. For long a source of groundwater for the city, the valley has been affected by the disposal of waste (Abdallah 2017). This has increased the risk of groundwater pollution, which may only compound the problem of water scarcity in Riyadh. The various sources of groundwater pollution in Wadi Hanifa include the following: seepage from agricultural activities; leaks from waste disposal; accidental spills and leakages; and leaks from storage tanks and pipes (Abdallah 2017). One of the respondents (R5) blames rapid urbanisation for the residents' decision to dispose waste in such areas as Wadi Hanifa.

"However, rapid urbanisation has reduced the space for dumping waste forcing people to dump waste in the desert" – ***Riyadh resident (R5).***

- *Changes in land use*

The rapid urbanisation in Riyadh has also affected desert and arid land through changes in land use. Most respondents were of the perception that most of the land area has been taken up by residential buildings as compared to industrial and commercial buildings. Take the case of one of the respondents (R3) who decried the fact that residential buildings have taken up the lion's share of the land area has reduced the availability of open space as well as recreational parks.

> *"One of the planning mistakes in some districts is that changing land use from open spaces to another use such as residential use and in this case sidewalks are unavailable and inaccessible, therefore many of the districts in Riyadh become concrete bulks, as a result no sidewalks are available for pedestrians to walk through, as well as no public realms, parks and gardens," –* ***Riyadh resident (R3).***

The respondent's sentiments are backed up by statistics from Arriyadh Development Authority (ADA), which confirm that most of the land area is used for residential purposes. Whereas the percentage of the land area used for commercial purposes is 1.97%, the percentage proportion used for residential purposes is 17.80% (ADA, 2010). On the other hand, the percentage proportion of land area used for recreational purposes is 6.48% compared to 10.6% used for education, government and health services. In his study, Almayouf (2013) notes that Riyadh has one of the lowest green space per capita in the world as compared to other cities, such as Curitiba in Brazil. This significant change in land use is attributable to the huge oil revenues that precipitated rapid development, which began more than three decades ago (Alqurashi and Kumar 2014). Although a substantial number of respondents felt that this changing land use was negative, there were others who were of the opinion that the change in land use had come with positive changes. One of the respondents (R5) noted that rapid urbanisation had influenced the reclamation of certain land areas that were previously unproductive via techniques, such as landscaping.

> *"Rapid urbanisation also has managed to use unexploited areas in the city and changed them into landscaping and recreational use, such as Namar Valley, and some parts across the city," –* ***Riyadh resident (R5).***

It is not only the Namar Valley that has benefitted from rapid urbanisation insofar as land reclamation is concerned but also Wadi Hanifa. Thanks to an ecological restoration project, the valley has been transformed from a dumping ground into a tourist attraction site. This restoration

project has been a success thanks to technological innovations in environmental planning (Muneerah 2015).

6.4.5. Challenges in Planning for Sustainable Urbanisation

The respondents were interviewed regarding their perceived impediments to the sustainable urban planning in Riyadh (Figure 6-29). Amidst their comments, the following challenges were identified by most of the residents interviewed (See figures 6-30-1/6-30-2 for further details on the challenges).

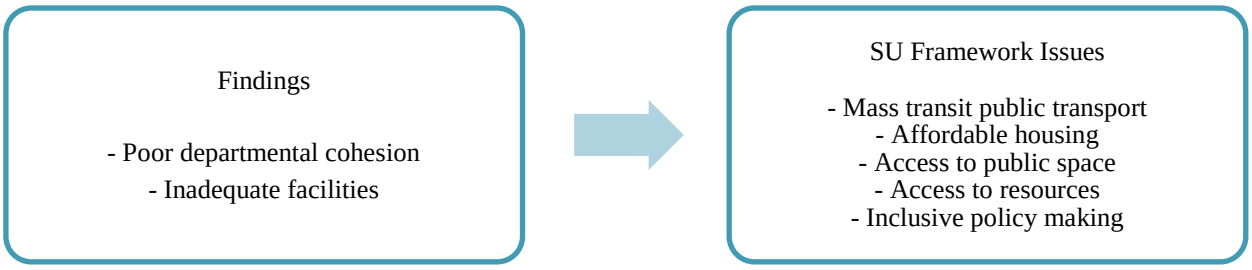


Figure 6-29: Interview process of Riyadh residents on the challenges in planning for sustainable urbanisation

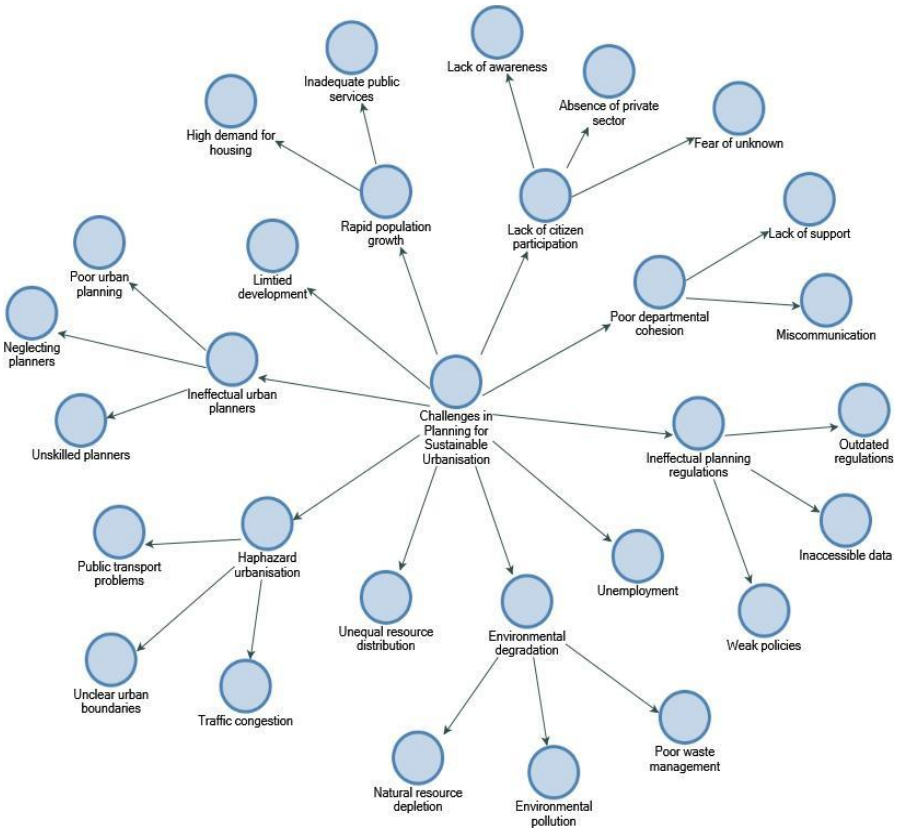


Figure 6-30-1: Relationships in theme Challenges in Planning for Sustainable Urbanisation

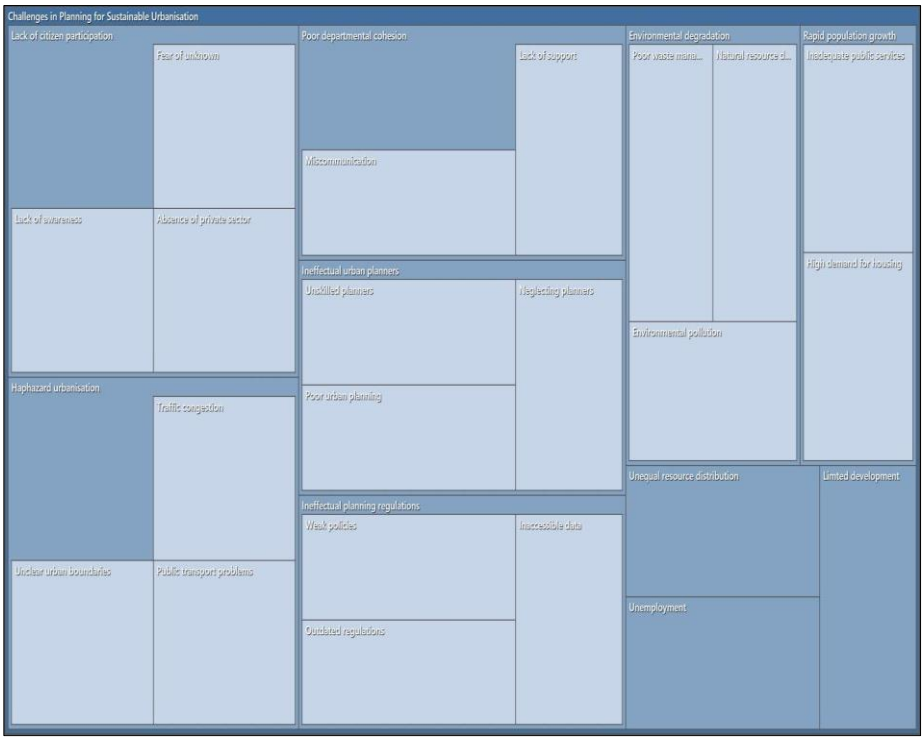


Figure 6-30-2: Hierarchy in theme Challenges in Planning for Sustainable Urbanisation

- *Poor departmental cohesion*

According to the interviewed Riyadh residents, poor departmental cohesion among urban planning authorities is a key challenge in sustainable urban planning. Interviews with most residents painted a picture of a municipality whose efforts at sustainable urban planning are disjointed due to lack of expertise and knowledge as well as lack of appropriate mechanisms. The following is a comment by one of the respondents (R10) outlining why poor departmental cohesion is one of the biggest challenges confronting sustainable urban planning:

> *"Developers, who have no enough experience and know nothing about sustainable urbanisation and urban planning, and they only think about profits and revenues, therefore planning and development should be assigned to specialists and experts"* – ***Riyadh resident (R10).***

Various studies have likewise identified poor departmental cohesion as a challenge in sustainable urban planning. For example, Future Saudi Cities Programme (2016) points out that urban planning stakeholders at the different levels of governance operate as silos by excluding each other when developing their respective strategic objectives and decision-making. Lack of cohesion among them is subsequently a recipe for poor dialogue, collaboration and coordination among

these agencies. The result is the formulation of irrelevant policies and poor implementation of the same.

Some of the respondents further blamed the lack of relevant legislation and guidelines for the poor department cohesion. One of the respondents (R12) noted that outdated regulations and policies have laid the foundation for an increase in urban sprawl. The following is her full comment:

> *"Poor regulations and policies as the main cause of the rapidity of urban land-take because they fail to allocate the proper land for the proper use in development projects" –* ***Riyadh resident (R12).***

Another resident (R21) offers the same comment but goes ahead to call for a halt to all the new development projects until the old ones are improved or upgraded:

> *"Policies hinder sustainable planning as a result of urban expansion caused by these policies in addition to informal uses and slums. In order to stop this expansion, we have to stop new development projects and we have to enhance the quality of the existing one"-* ***Riyadh resident (R21).***

That poor legislation and policies is responsible for the poor intervention by municipality officials is no news considering that many studies have decried the existence of outdated laws that cannot enhance the urbanisation process. UNHABITAT (2016) reports the findings of a study conducted with AMANAH officials where the officials noted that policies and legislation have remained the same whereas the composition and population of the municipalities have changed in recent years. The officials further note that the fact that the state of affairs – as far as legislation and policies are concerned – means that they will encounter a myriad challenge in fulfilling their roles and responsibilities. Regarding weak policies and legislations, one of the major areas that have been affected is land use. ADA (2010) notes that the proportional land area used for cultural, hospitality, recreational and religious services constitute less than half the proportion stipulated by MEDSTAR's suggested land use mix for Southern Riyadh. This is indicative of policies that are rarely implemented to the letter as far as land use is concerned. In this study's interview with residents of Riyadh, a few them decried the fact that land use policies and legislation have not been implemented as stipulated. One of the respondents noted that most attention has been given to residential buildings due to the increasing demand for residential accommodation in the municipality owing to the rapid population growth. Indeed, ADA (2010) notes that there is a high concentration of residential land use, particularly in the southern region of Riyadh. Even then, it would seem as if land use is heavily skewed in favour of the wealthy people in the municipality because most of these resulting residential buildings are pricey for many poor people. This is

captured by the following sentiment by one of the respondents (R22) who notes that the land use planning policies have failed to provide affordable housing:

> *"Land use planning policies also failed to provide affordable housing as Riyadh suffers from this issue, as well as providing more slums at the outskirt of the city" –* ***Riyadh resident (R22).***

- *Inadequate public facilities*

Interviews with residents of Riyadh also reveal that inadequate public facilities are a challenge in planning for sustainable urbanisation. These perceptions are geared towards the poor construction of public facilities that contrast with the features of sustainable urbanisation. Indeed, in line with the rapid population growth rate in Riyadh, the municipality has engaged in various development projects that have helped establish the city's reputation as one of the largest commercial and residential centres in the Arabic Peninsula. The city's landscape – in contrast to the 1960s and 70s – is nowadays dominated by skyscrapers, industries and residential buildings, such as villas. Even amidst these infrastructural developments, residents still reiterate on the importance of the municipality developing more open spaces, gardens, recreational facilities and parks. An example is the following comment by a resident (R18) who notes that many residential areas still lack recreation facilities, playgrounds and gardens.

> *"They didn't consider the establishment of open spaces, recreational facilities, playgrounds, gardens and parks in some residential areas" –* ***Riyadh resident (R18).***

This comment by the resident corroborates similar sentiments by Almayouf (2013) in his study in which he notes that municipality officials did not consider the need for open spaces, leisure and recreational facilities when undertaking development projects in Riyadh. The lack of enough green services is further compounded by the increasing population in the municipality, which is further projected to increase in 2004-2024. Almayouf (2013) adds that Riyadh – which is composed of 209 residential communities and 13 sub-municipalities – is affected by unequal distribution of the available green services.

Interviews with the respondents also reveal that overreliance on car transport is a challenge to sustainable urban planning insofar as public are concerned. These perceptions seem to confirm various studies and reports that have decried the traffic congestion problem in the municipality. Alotaibi (2017) notes that the vehicular trips in Riyadh city have increased from 1 million in 1987 to 6 million in 2010, which have led to serious congestion because of the lack of enough major arterials. Alotaibi (2017) also notes that the public transport sector in Riyadh has been neglected for many years as many residents have resorted to private automobiles as their mode of transport.

The resultant effect is that the number of private cars on the roads has increased, in effect increasing traffic congestion (Alotaibi, 2017). The fact that many development projects have neglected the public transport system is noted by one of the respondents (R13) who reiterates on the need to reverse this trend:

> *"The public transport issue remains the main challenge in the city and should be integrated with links and road networks to accommodate this vital project"* **– *Riyadh resident (R13).***

Based on previous studies of the effects of this poor transport system, it is imperative that the officials concerned pay attention to these aforementioned sentiments by Riyadh residents. Ramisetty-Mikler and Almakadma (2016) reveal that the increased car ownership has caused other challenges related to the road networks, such as driver error, poor car conditions, poor road safety and erratic driving behaviour. Global Mass Transit (2011) attributes an ineffective public transport system to economic, social and regulatory barriers. An example of a regulatory barrier is the existence of irrelevant policies and legislations that are ineffective for precipitating a shift in demand for private to public transport modes (Alotaibi 2017). This statement brings to the fore earlier discussion on the weak legislations and policies that most residents identified as the reason for poor intervention by municipality officials. In respect to this, it would seem that weak policies and legislations are intertwined with the other challenges identified by residents with regards to planning for sustainable urbanisation.

6.4.6. Integration of sustainable urbanisation into future development

The study sought to understand – residents' perceptions – how sustainable urbanisation can be integrated into future development projects in Riyadh (Figure 6-31). The interviewees provided several suggestions on the same (See figures 6-32-1/6-32-2 for detailed).

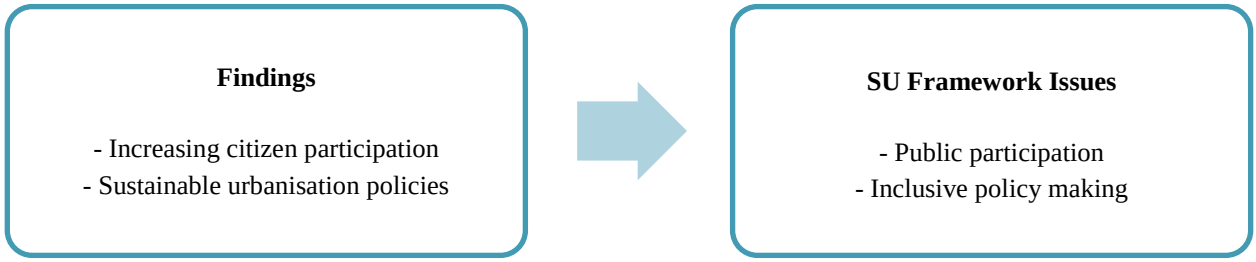


Figure 6-31: Interview process of Riyadh residents on integration of sustainable urbanisation into future development of KSA cities

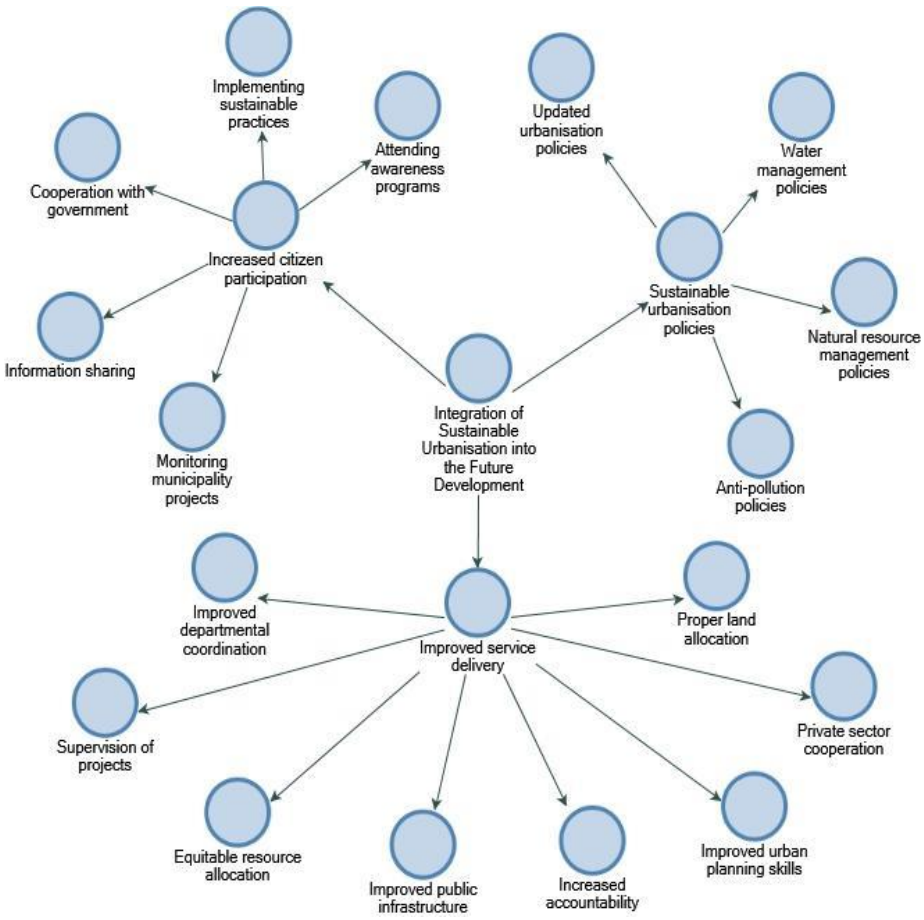


Figure 6-32-1: Relationships in Integration of sustainable into the Future Development

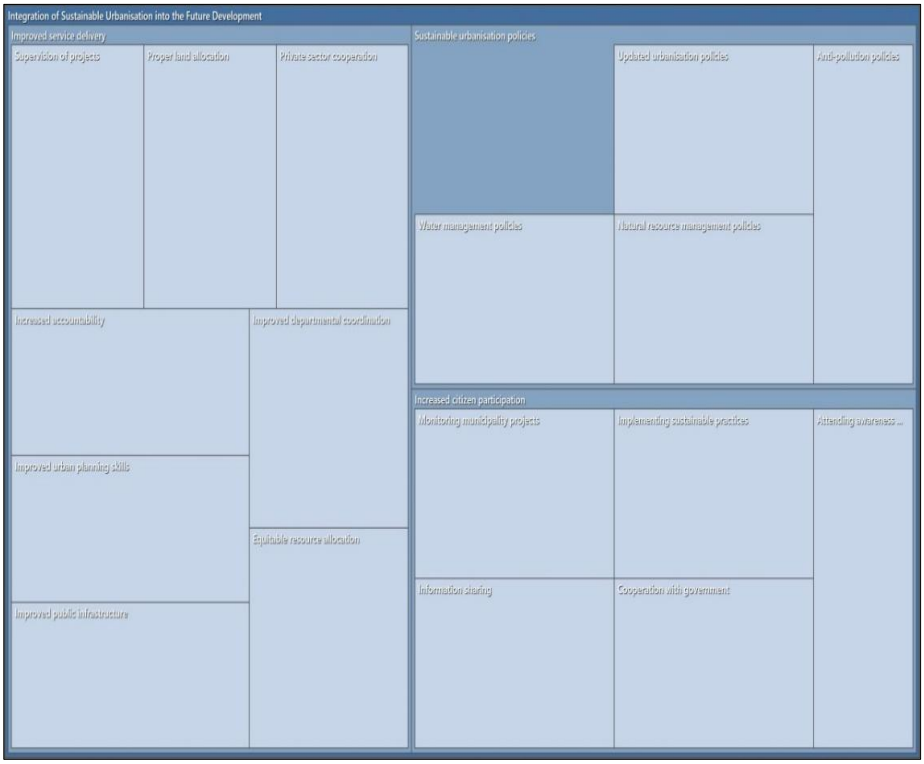


Figure 6-32-2: Hierarchy in Integration of sustainable into the Future Development

- *Increasing citizen participation*

According to most residents, the most effective way of integrating sustainable urbanisation into future development projects is by increasing citizen participation in various urban planning activities, such as policy formulation, decision making and implementation. One of the key ways of improving citizen participation that the respondents stressed upon was information sharing. One of the respondents (R6) warned that residents cannot cooperate with the government in implementing sustainable urbanisation if they do not understand the meaning of sustainable urbanisation.

> *"They also need to talk to us as the community in this area because if we are not aware of sustainable urbanisation then we will not be cooperative" –* ***Riyadh resident (R6).***

Various studies have reiterated on the importance of public participation in urban planning process. UNHABITAT (2016) notes that previous processes of urban planning in Riyadh and KSA in general have not involved the public resulting in the formulation of policies and legislations that do not cater to the needs of the residents. On the contrary, public participation in the urban planning and development process will ensure that the residents take a proactive role in the implementation of the subsequent policies and legislations motivated by the knowledge that these policies will improve their wellbeing. UNDP (2016) further notes that public participation is a form of participatory governance, which ensures that the task of urban planning and development is not left in the hands of the elite who may not always have the interests of the common citizens at heart. As active participants in urban planning and development, the public has the opportunity to hold their leaders accountable for their actions insofar as the management of the city is concerned. Moreover, Abdulaal (2008) points out that government officials, including at the local level, have an obligation to share information with the citizens regarding the government's performance on certain benchmarks. It is their responsibility to ensure that the public has easy access to information and that they are better informed than before they access this information. Other respondents reiterated that information sharing should not only be from the municipal council to the citizens but also the citizens themselves. Those who held this view noted that this would enhance a cohesive community dedicated to creating a sustainably urbanised centre. One such respondent (R27) proposed the establishment of public forums as platforms for information sharing.

> *"I propose that citizens of Riyadh should hold forums and meetings to express their opinions and thoughts about sustainable communities and the benefits and advantages of sustaining communities of the city. I encourage the establishment of community centres within residential areas and neighbourhoods where residents can meet and discuss their*

affairs and issues related to the neighbourhood and how they can work collectively to improve the quality of life and improvement of environmental situation there," – ***Riyadh resident (R27).***

In line with his proposal, the various methods of public participation could include Q&A sessions as well as public meetings.

Interviews with the respondents also brought to the fore the importance of awareness programmes to help the citizens understand the importance of sustainable urban practices. Many of the respondents were of the opinion that enhanced awareness would empower them to implement sustainable urban practices in their daily activities. A case in point is one respondent (R16) who pointed out that public awareness are a necessity to enable them to understand the advantages of using sustainable materials for building physical infrastructures.

"Then it should activate also the public awareness to inform community members about benefits and advantages of being involved in building of proper housing and other physical infrastructures," – ***Riyadh resident (R16).***

Another respondent (R11) emphasised that awareness programmes should be the first step before the public is asked to implement sustainable urban practices.

"The municipality has an obligation to educate us on why we should take sustainable urbanisation seriously. We need to know the various kinds of sustainable urban practices. This should be the starting point for improving the situation in this city" – ***Riyadh resident (R11).***

Indeed, various studies have identified the need for awareness programmes if the various urban projects by the government are to succeed. Al-Surf and Mostafa (2016), for example, advise that public awareness on the concepts of sustainable practices will be integral to the achievement of a healthier, better, environmentally sound and affordable urban projects. The two add that the low level of public awareness on sustainable practices has been an impediment to the actualization of sustainable development in Riyadh – and Saudi Arabia in general.

- *Sustainable urbanisation policies*

According to the respondents, the second major way of integrating sustainable urbanisation into future development projects is via sustainable urbanisation policies. Many scholars have highlighted the fact that urban planning policies for Riyadh are outdated and misaligned with the reality of the current situation in which the population of the municipality has increased since the 1960s when it was simply a small village. Policy planning and formulation process during 1930-

70 was undertaken in an ad hoc manner in response to short term issues (Bajaber 2017). Most of the respondents proposed that the current policies need to be updated in line with the way the landscape of the municipality has changed. One such respondent (R19) noted that improving the current urban planning regulations would spur the achievement of the goals of 2030 Vision.

> *"To establish sustainable communities, we have to develop a framework and apply it carefully; this framework should include new and updated policies, regulations and legislations that enhance the sustainable development and how to realize the national transformation programs and the goals of 2030 Vision," –* ***Riyadh resident (R19)***.

One type of policy that many respondents emphasised upon is anti-pollution, perhaps an indicator of the importance that many Riyadh residents attach to the need for environmental conservation. One of the respondents (R6) went to the extent of proposing heavy fines and penalties against companies that are found to be dumping industrial waste carelessly.

> *"What I would love to see that these companies are forced to reduce the amount of waste they release into the environment. Companies that pollute the environment a lot should not be allowed to operate in the city or should be heavily fined," –* ***Riyadh resident (R6).***

In their consensus-based framework for sustainable urbanisation, Alqahtany et al. (2014) advocate for policies to control noise and wastewater pollution in addition to improving air quality.

6.5. Academics and researchers

Interviews were conducted with 20 academics and researchers of sustainable urbanisation to understand their perspectives on sustainable urbanisation in Riyadh insofar as the following six themes are concerned. Table 6-3 details the profiles of the academics interviewed for the study.

Table 6-3: Profile of academics interviewed in the main study

Academic (A)	Profession	Area of specialisation	Years of experience
A1	Lecturer/Researcher	Population and Demography	23
A2	Lecturer/Researcher	Urban planning	25
A3	Lecturer/Researcher	Urban planning	19
A4	Lecturer/Researcher	Environmental management	21
A5	Lecturer/Researcher	Architecture	37
A6	Lecturer/Researcher	Economic planning	23
A7	Lecturer/Researcher	Political science	17
A8	Lecturer/Researcher	Human migration	20
A9	Lecturer/Researcher	Structural engineering	18
A10	Lecturer/Researcher	Urban planning	25
A11	Lecturer/Researcher	Urban planning	30
A12	Lecturer/Researcher	Urban planning	17
A13	Lecturer/Researcher	Natural resource management	13
A14	Lecturer/Researcher	Urban planning	30
A15	Lecturer/Researcher	Policy analysis	24
A16	Lecturer/Researcher	Public health	18
A17	Lecturer/Researcher	Architecture	13
A18	Lecturer/Researcher	Urban planning	10
A19	Lecturer/Researcher	Development communication	12
A20	Lecturer/Researcher	Natural resource management	14

6.5.1. Barriers and Drivers of Sustainable Urbanisation

This theme includes questions that seek to find answers as to the factors inhibiting sustainable urbanisation in Riyadh as well as those that may accelerate it. Interviews with the academics subsequently identified the following barriers and drivers of sustainable urbanisation in Riyadh.

6.5.1.1. Barriers

The academics were interviewed on their perceptions regarding the barriers to sustainable urbanisation in Riyadh. They identified various barriers as indicated in Figure 6-33 (See figures 6-34-1/6-34-2 for details).

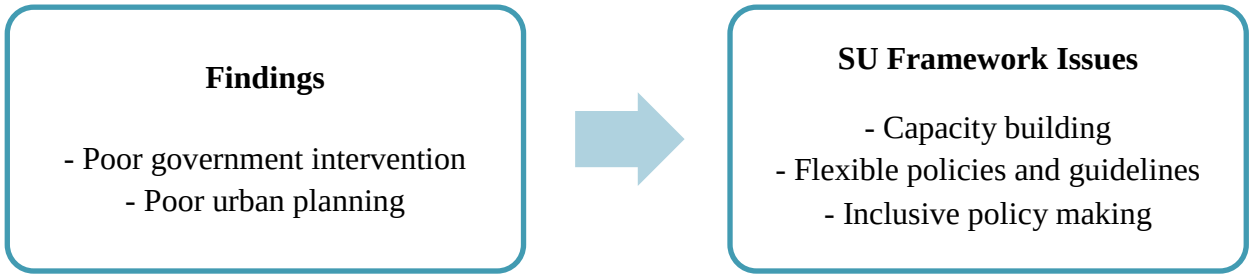


Figure 6-33: Interview process of Riyadh residents on barriers to sustainable urbanisation

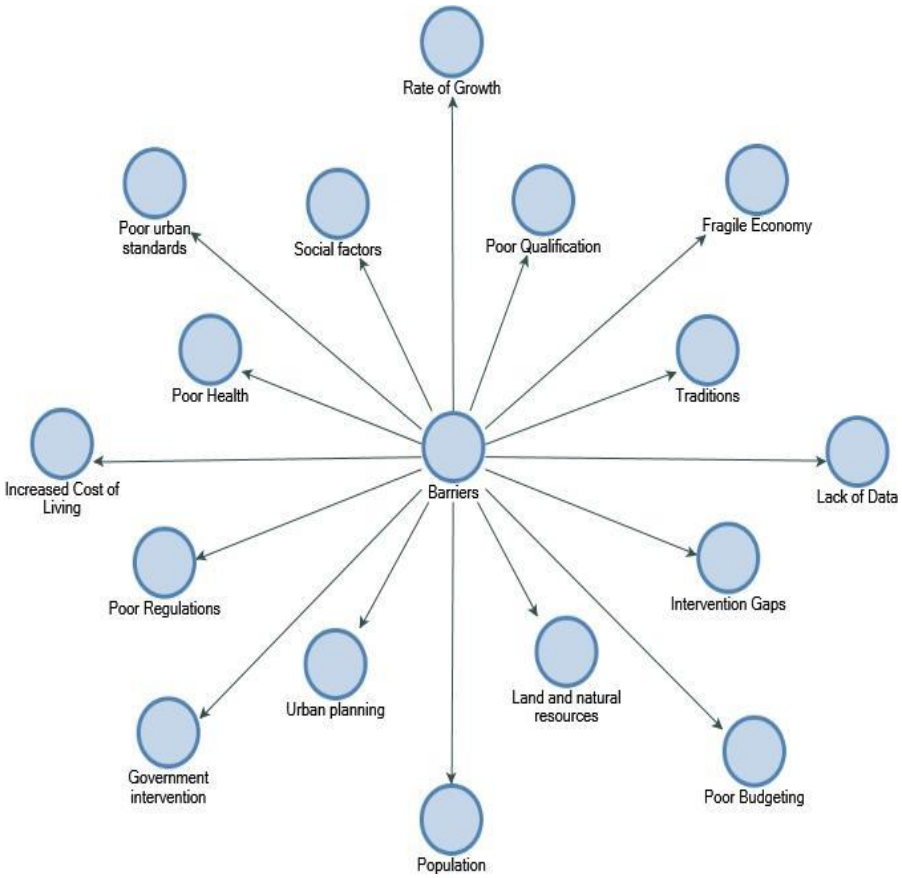


Figure 6-34-1: Barriers to Sustainable Urbanisation

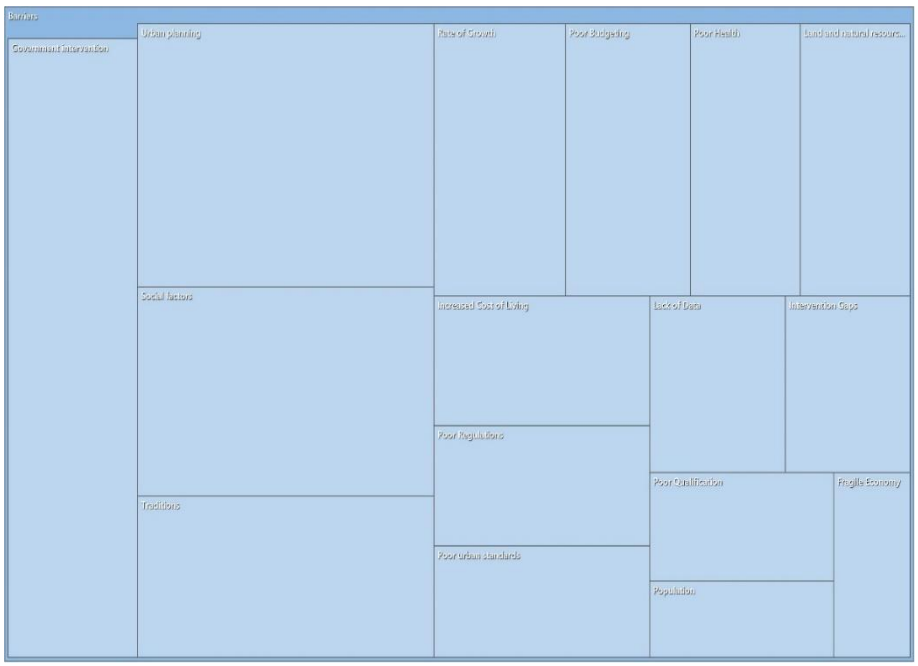


Figure 6-34-2: Hierarchy in theme barriers of sustainable urbanisation

- *Poor government intervention*

Most of the academics pinpointed poor government intervention as the biggest barrier to sustainable urbanisation in Riyadh. They cited previous government efforts in urban planning as evidence of poor government intervention considering that such efforts were unsuccessful. Upon further probing, the respondents identified lack of expertise and poor departmental coordination as factors that cause poor government coordination. For example, one of the academics (A15) bemoaned the lack of coordination between the various agencies tasked with urban planning.

> *"Lack of appropriate institution with the capacity to coordinate activities of other public agencies, negotiate practicable terms with contractors" –* ***Academic (A15)***.

Poor government coordination is an issue that has been identified in other research reports and subsequently highlighted. This poor coordination is exemplified by poor information flow from the top to the bottom considering that the urban planning agencies, including ministries operate in silos (Future Saudi Cities Programme, 2016). This means that the agencies come up with strategies that overlap each other and may not be particularly relevant to the prevailing circumstances as far as urbanisation trends are concerned. Some of the academics further bemoaned the lack of community involvement in policy formulation. One of the respondents (A18) in particular accused the Ministry for Municipal and Rural Affairs (MOMRA) and the High Commission for the Development of Riyadh.

"The High Commission for the Development of Riyadh and the MOMRA didn't involve the community in developing these policies and decisions" – ***Academic (A18).***

Although community participation has been one of the targets of the National Transformation Plan (NTP) 2020, community engagement is yet to gain pace in Riyadh, as well as in KSA generally. A study by Al-Surf et al. (2013) for instance, revealed that public awareness about sustainable housing was still low. In such a population in which awareness levels are still low insofar as sustainable development is concerned, increasing community participation may be an uphill task to achieve.

- *Poor urban planning*

The academics also mentioned poor urban planning practices as a barrier to sustainable urbanisation in Riyadh. Many of them pointed out the poor walkability as an example of infrastructures that have been affected by poor urban planning. One such respondent who held this view (A14) noted that the current walkability corridors do not have enough shades to shield people from the harsh weather.

"Walkability corridors should be provided with enough lighting and should be shaded also to protect residents from sunlight" – ***Academic (A14).***

Poor walkability is not an issue that is exclusive to Saudi Arabia but has also been witnessed in the other big cities of the Gulf region. Kamel (2013) describes walkability as a forgotten mode of transport in the region because of residents' overdependence on private cars as well as the scorching heat. Closer home, walkways have been accorded less attention by the urban planning authorities as the population of Riyadh continues to grow and the need for housing continues to rise concurrently. Ledraa's (2015) study notes that older neighbourhoods boast wider and better walkways compared to those of newer suburban neighbourhoods. The hot weather has also discouraged many residents from adopting a walking culture who instead prefer to use private cars as their mode of transport.

Many of the respondents also cited the lack of adequate green and open spaces as an example of poor urban planning. They were of the opinion that sustainable urbanisation would remain a mirage if the municipality does not factor in open spaces and green spaces in their urban plans. One of the respondents (A18) bluntly expressed his opinion about the lack of open spaces.

"The lack of open spaces and green areas within residential areas" – ***Academics (A18).***

The lack of adequate open spaces and green spaces in Riyadh has been a main feature of the conversation on the importance of sustainable urbanisation. Almayouf (2013) decries the fact that Riyadh has one of the lowest green spaces per capita in the world at 0.86 km^2 compared to New

York City, which has the highest green space per capita at 91 km^2. This situation has been attributed to a number of factors, including poor land distribution, encroachment on land for commercial purposes and depletion of groundwater resources.

6.5.1.2. Drivers

The drivers of sustainable urbanisation refer to the circumstances or factors that would enhance sustainable urbanisation in Riyadh. The academics identified the following drivers of sustainable urbanisation (See figures 6-36-1/6-36-2 and Figure 6-35).

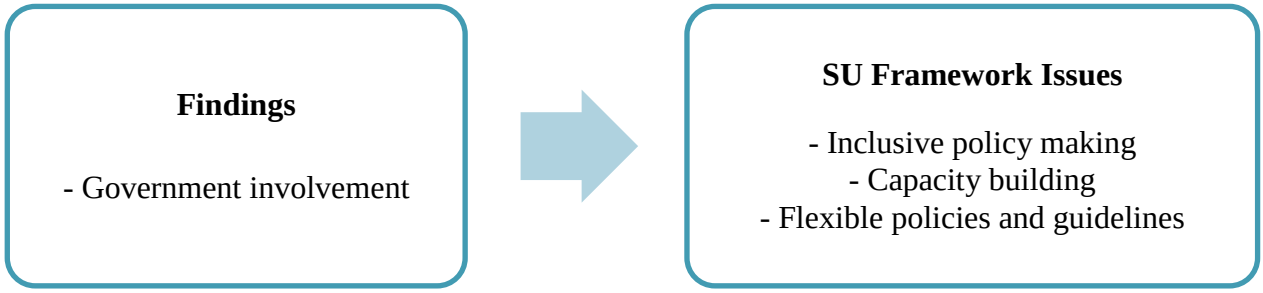


Figure 6-35: Interview process of Riyadh residents on drivers of sustainable urbanisation

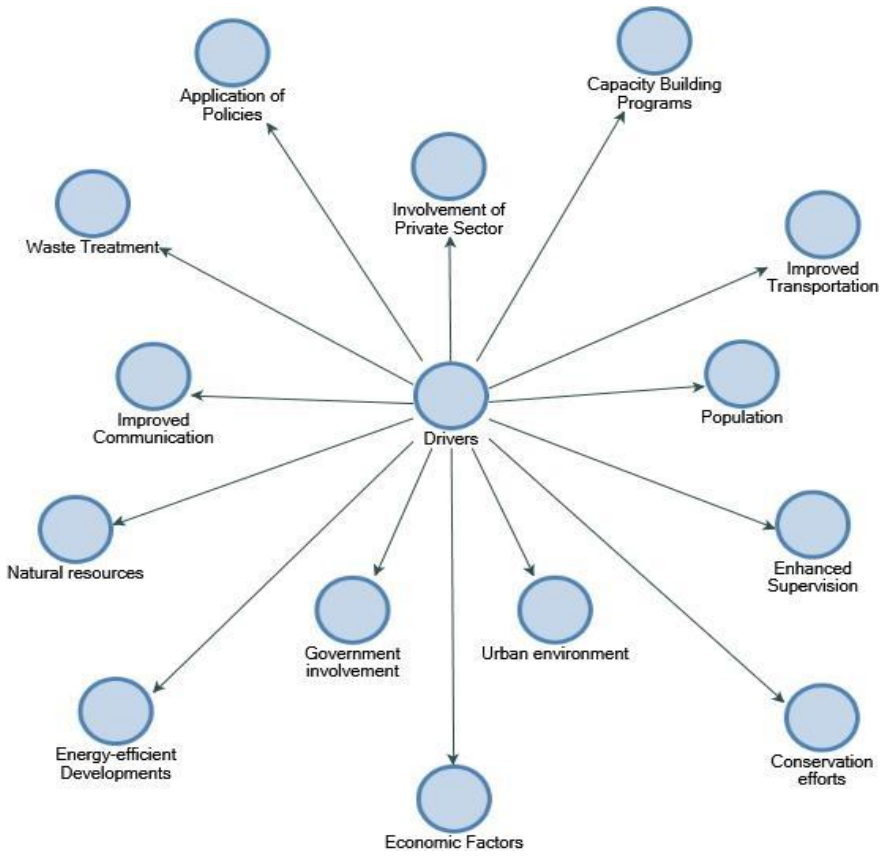


Figure 6-36-1: Drivers of sustainable urbanisation

Figure 6-36-2: Hierarchy in theme drivers of sustainable urbanisation

- *Government involvement*

According to most of the academics interviewed, increased government involvement in sustainable urbanisation will be pivotal to its success. The respondents added that the government has certain obligations to fulfil without which sustainable urbanisation efforts will be fruitless. One such respondent with this view (A6) mentioned specific obligations that the government should fulfil.

> *"Setting the proper policies to achieve sustainability, providing the enough budgets and financial resources to fund urban projects, review the current regulations and legislations and do the necessary modifications to them" –* ***Academic (A6).***

To the government's credit, there have been concerted efforts at entrenching sustainable urban practices as has been exhibited in the case of many of its economic plans, such as NTP 2020 and Saudi Vision 2030. Al-Surf and Mostafa (2016) point out that the youthful leadership of the Royal family has been at the forefront in steering legislations and regulations of all sectors of the economy. The political commitment was exhibited when Prince Mohammed Bin Salman Al Saud led the launching of the Saudi Vision 2030 in May 2016 during which he declared that the occasion was a new beginning for the kingdom.

Another respondent (A7) provided a description of positive government involvement as far as sustainable urbanisation is concerned.

> *"So the successful political leader according to my point of view is the one who live with citizens closer to them and feel their issues and concerns" –* ***Academic (A7).***

The municipality and sub-municipality officials are the closest the government has been to the people. Participatory governance can cement this relationship further by bringing the people and the local government officials together to discuss pertinent issues affecting the city. Apart from improving social cohesion among residents, this form of governance ensures that people have an important stake in decision making on crucial issues affecting their welfare (UNDP 2016). Participatory governance is an opportunity for the people to hold these officials accountable regarding the use of city resources and delivery of public services.

6.5.2. Improving quality of life

The academics identified the following as the ways in which sustainable urbanisation would improve the quality of life for Riyadh residents (See figures 6-38-1/6-38-2 and Figure 6-37).

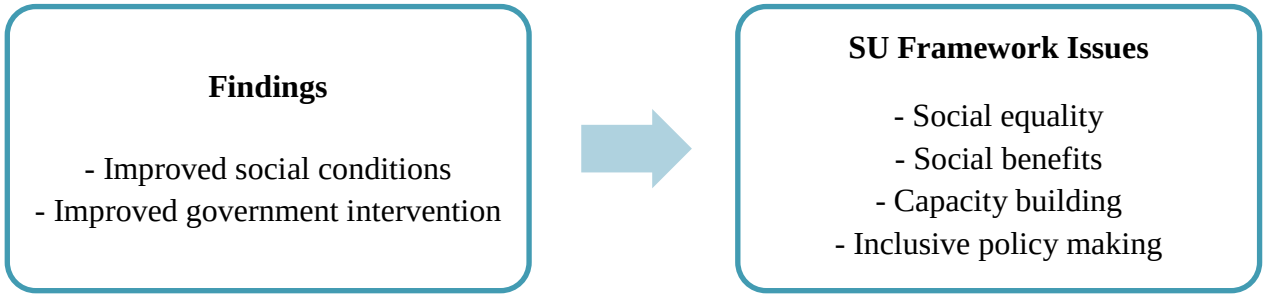


Figure 6-37: Interview process of Riyadh residents on improving quality of life

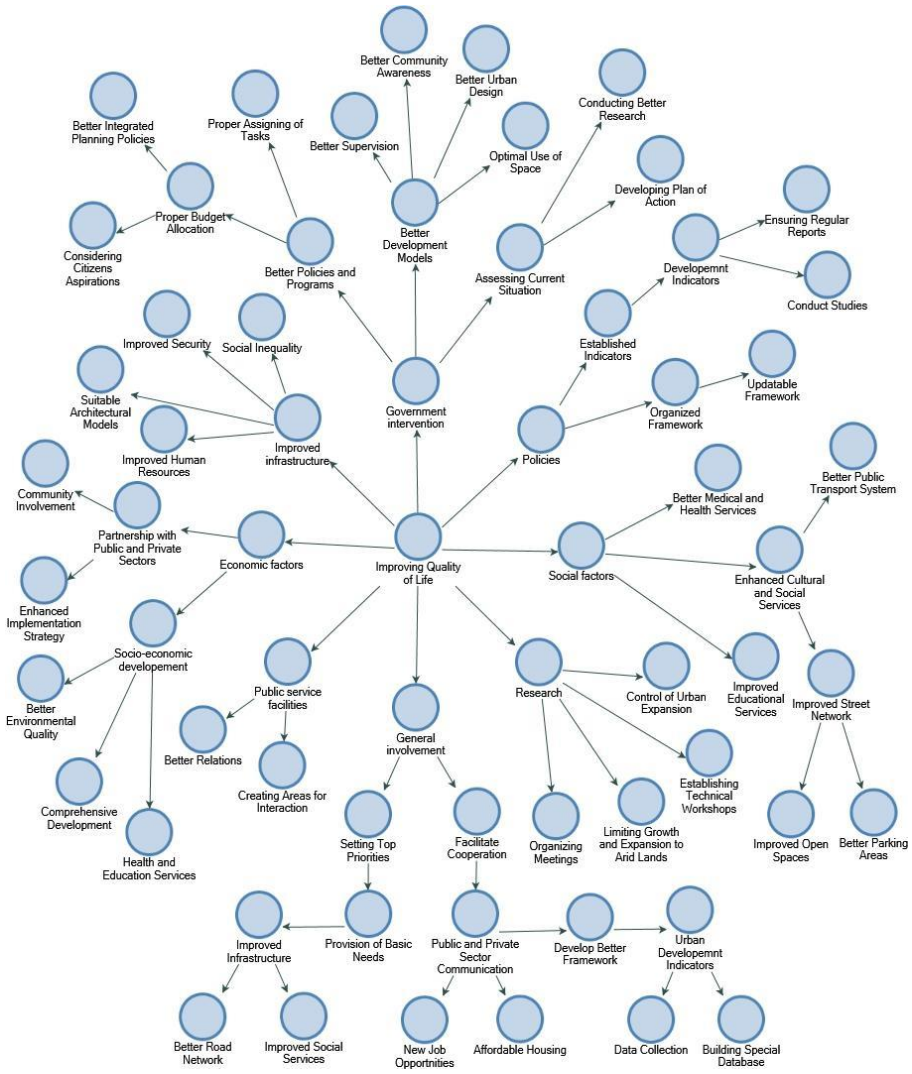


Figure 6-38-1: Relationships in theme Improving Quality of Life

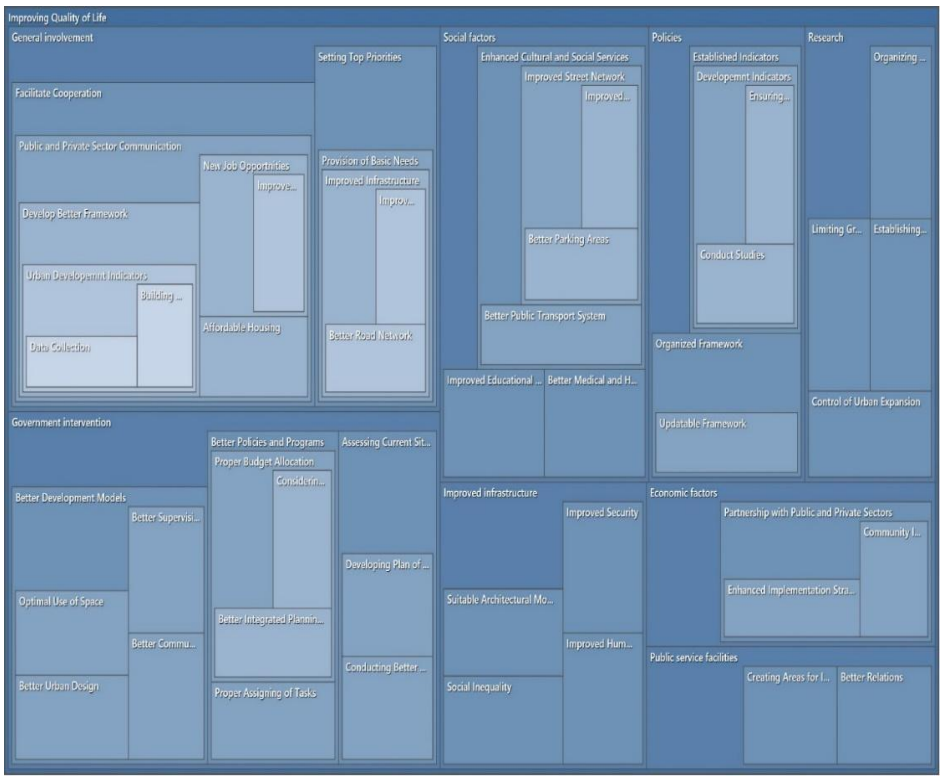


Figure 6-38-2: Hierarchy in theme Improving Quality of Life

- *Improved social conditions*

According to most of the academics, sustainable urbanisation can improve social conditions for Riyadh residents. Some of the social issues mentioned in this regard include adoption of sustainable energy resources, increased job opportunities, better housing and equal distribution of resources. One of the respondents (A2) noted that there is a link between unemployment and inability to access affordable housing.

> *"High cost, and the second problem is that many of citizens rent houses and this makes them feel uncomfortable, therefore, there is a clear suffering in terms of housing as a result of the widespread of unemployment among citizens" –* ***Academic (A2).***

Just like the aforementioned sentiment, Al-Surf et al. (2013) note that there is a link between unemployment and lack of better housing – a problem that is not only prevalent in Riyadh but also in Jeddah. Most of those affected are migrants who have come from rural areas to look for jobs in these cities but are unsuccessful and thus settle for informal settlement where the living conditions are squalor.

Regarding the unequal distribution of resources, respondents noted that sustainable urban planning should ensure that resources are distributed equally to the different areas in the municipality. One

of the respondents (A7) noted that unequal distribution of resources – although rare – is caused mainly by greed.

> *"Unequal distribution of services in some residential areas but this rarely occurs and it is easy to control it through many steps. I think the good management system of these resources will realize equality among citizens and residents of Riyadh. Greed may be another cause of unequal distribution of resources especially in land uses and zoning, but if we enhance transparency among officials and fight against some bad social behaviours, this inequality will be reduced" –* ***Academic (A7).***

Indeed, inequality is an issue that KSA – and not just Riyadh – will have to grapple with if sustainable urbanisation is to improve the quality of life. While the economic fortunes of the country have been positive, there are millions of young people who are jobless whereas the jobs they can perform are in the hands of foreign workforce – this is despite the Saudization policy notwithstanding. Statistics provided by Foran et al. (2014) shows that the wealth inequality in Saudi Arabia is higher than other countries, such as the U.S. and U.K.

- *Government intervention*

Whereas most respondents considered poor government intervention as the biggest impediment to sustainable urbanisation, many respondents subsequently felt that improved government intervention is important for sustainable urbanisation to improve the quality of life. Some of the areas in which respondents felt that government intervention is necessary include job creation, provision of affordable housing, governance structure and equal distribution of resources, among others. One of the respondents (A17) noted that increased job opportunities would reduce the cost of living for those affected.

> *"Creation of new job opportunities for Saudi youth and this will participate also in the reduction of cost of living" –* ***Academic (A17).***

It is noteworthy that the latest government intervention as pertains to creation of job opportunities has been the Saudization policy. It requires that private firms should employ a certain percentage of Saudi youth considering that many of the jobs in the public sector have already been taken. Foran et al. (2014) notes that this is a positive step towards improving the livelihoods of millions of Saudi youth who have been left frustrated at the lack of job opportunities even after graduation from institutions of higher learning.

Regarding the governance structure, the respondents proposed that the government should alter the governance structure to allow the municipal authorities work more efficiently. One such

respondent (A15) with such a view noted that doing so would create accountability in the municipalities.

> *"Proper solution is to separate municipal councils from the management of the MOMRA because this is a wrong principle and it was addressed in a wrong manner, thus you can evaluate each services provided to the neighbourhood and help in providing needs" –* ***Academic (A15).***

MOMRA is responsible for overseeing the activities of municipalities and offering guidance to them insofar as implementation of laws is concerned. One of the problems of this arrangement is that the municipal councils have been reduced to agents of the central government in which they do not have much autonomy to undertake independent decisions on issues affecting the citizens within their jurisdictions.

Many of the respondents also felt that the government should intervene in the housing crisis and ensure that the prices of houses are reduced so that most of the citizens can afford them. One of these respondents (A17) said that government intervention will ensure fair distribution of the houses.

> *"Local authorities should think about the best mechanisms to provide housing in low prices and distribute it equally among citizens" –* ***Academic (A17).***

The role of the government (or the lack of it) in enhancing sustainable housing is a matter that has been discussed in many research papers. Al-Surf et al. (2013) blame the housing crisis on the lack of regulations from the government to compel developers to use sustainable technologies in building affordable housing. The authors further propose that the government can play a crucial role by introducing rules and regulations as well as smart technologies that allow construction firms build sustainable structures that are affordable and use sustainable building materials.

6.5.3. Social, Environmental and Historical Factors Affecting Sustainable Urbanisation

Following interviews with the academics, the following social, environmental and historical factors were identified (See figures 6-42-1/6-42-2 for details).

6.5.3.1. Social factors

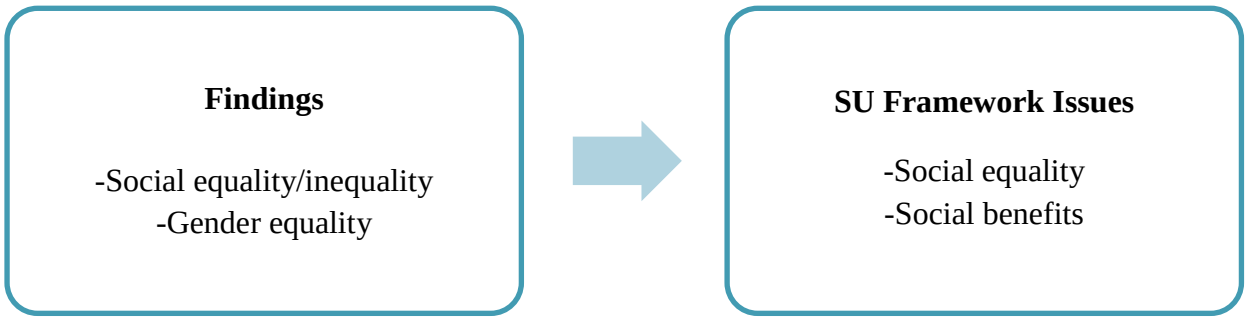


Figure 6-39: Interview process of Riyadh residents on the social factors affecting sustainable urbanisation

- *Social equality (or inequality)*

According to a majority of the respondents, social equality (or inequality) is the key social factor that will influence sustainable urbanisation. Respondents who talked about this issue mentioned that social inequality has been a major feature of the country even though it has undergone an economic boom thanks to the oil boom. One such respondent (A17) noted that social equality should apply to all aspects of the lives of the residents of Riyadh city.

> *"Make social equality one of our major principles in the city and the country as whole and this can only be achieved through distributing all basic services and infrastructures equally across the city. Based on this principle, we have to maximize the social equality in all aspects of Riyadh city" –* ***Academic (A17).***

The aforementioned sentiment seems to echo that of Al-Khateeb's (2015) article in which he notes that social equality is an issue that the Saudi government must prioritise. The author decries the fact that the youth have not been offered equal access to job opportunities, which may tempt many of them into engaging in criminal and radical activities.

In other respondents' opinions, social equality has to do with equal access to health and education services. Such respondents felt that sustainable urbanisation would only be successful if residents of Riyadh could gain equal access to basic services, such as health and education. In particular, access to health in Riyadh and KSA in general has been the subject of several studies. Mansour's (2016) study of the distribution of health services in Riyadh revealed spatial inequalities between the central district of Riyadh governorate and the districts situated in the outskirts insofar as distribution of health facilities is concerned. In the districts situated in the outskirts of the

governorate, residents had to travel long distances to access health facilities compared to residents of the central district in the governorate. Alhowaish et al. (2018) study of the distribution of health facilities in KSA also reveals an unequal distribution of private polyclinics and public primary healthcare centres in the kingdom. Similarly, UNDP (2016) underlines the importance of dealing with spatial inequalities within cities and among cities. The repercussions of not dealing with spatial inequalities within a city include sprawling slums, poverty, poor sanitation facilities, environmental pollution, rampant unemployment, lack of social cohesion and emergence of criminal gangs, among others. The following comment by one of the respondents (A16) further mentions the need for equal distribution of basic services:

> *"Educational and employment opportunities should equally distribute, thus, we can ensure social equality in Riyadh" –* ***Academic (A16).***

To its credit, the government has done a lot of work to ensure that many Saudi youth can access health and educational opportunities. This has been exemplified during the reign of King Fahd, which has seen the rapid growth of educational facilities complemented by the increased enrolment of female students (Al-Saud 2018). In the health sector, the number of health facilities increased during his reign and has continued ever since. For instance, within a 29-year period (1970-1999), the number of major hospitals had increased from 47 to 186 while that of health centres had increased from 519 to 1,756. This is in addition to the 22 houses, 22 rehabilitation centres, 16 orphanages and 10 nursing homes that were developed in the same period for delinquents, orphans, disabled persons and elderly people within the same period. Furthermore, the government provided social security benefits to different categories of citizens, which peaked at SR2.6 billion in 1999 (Al-Saud 2018).

- *Gender equality*

Respondents also noted that women have a crucial role to play in adoption of sustainable urban practices and thus require gender equality. Gender inequality is an issue that elicits debate within and beyond the borders of Saudi Arabia. It was an issue that was likewise mentioned by some of the respondents who noted that it will be integral to the success of sustainable urbanisation. One respondent (A8) pointed out that women can play a key role in the achievement of sustainable urbanisation.

> *"Enhance the role of Saudi woman also so that she can participate in the development of our capital and achieve sustainable urbanisation" –* ***Academic (A8).***

UNHABITAT (n.d.) notes that gender equality can enhance survival of cities by unleashing the full potential of women who can then contribute to sustainable urbanisation efforts. Examples of

these efforts include adoption of sustainable energy sources, proper waste disposal and participation in policy formulation. To its credit, the Saudi government has made considerable steps towards increasing female participation in the running of affairs at different levels of government. This has been exhibited through the addition of a chapter on women in the Ninth Development Plan. This chapter outlines various strategies for increasing women participation in various aspects of the society, including economic activities, social research, community development and social care as well as family (MOMRA 2013). Furthermore, in 2012, women were granted the right to vote, which effectively ensures that they can participate in municipal elections.

6.5.3.2. Environmental Factors

Interviews with the academics identified the following environmental factors of sustainable urbanisation.

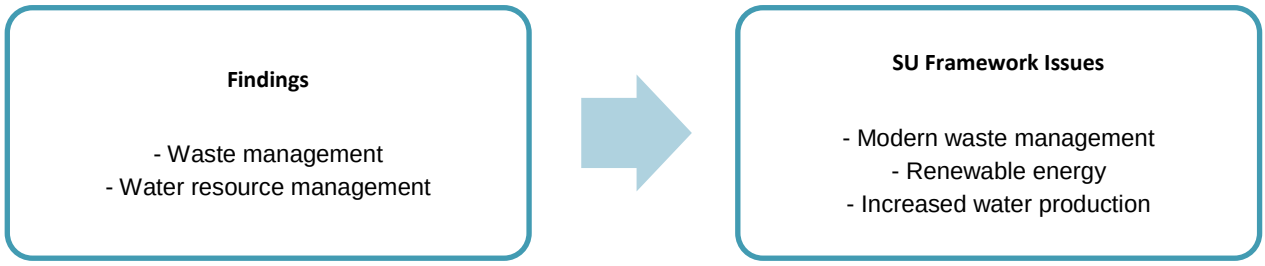


Figure 6-40: Interview process of Riyadh residents on environmental factors affecting sustainable urbanisation

- *Waste management*

Most of the respondents were of the opinion that the waste management methods used by the local government and the residents would determine whether sustainable urbanisation succeeds or not. Most of them felt that there is still much to be done to improve on waste management. One of the respondents (A10) proposed that the government would need to enact special programmes if waste management is to improve.

> *"Waste issue remains the most critical one among environmental issues and I think it will require a special program to be addressed. In my opinion, I consider waste issue as one of the everlasting problem of Riyadh city, and I suggest that we have to try new solutions to deal with it" – Academic (A10).*

As the population in Riyadh increases, so has been the amount of waste in the city. GAMEP (2017) acknowledges that municipal solid waste has increased in Riyadh and in other major cities due to increased population in these areas. This problem has further compounded by an increasing amount of medical, industrial and electronic waste that is hazardous and takes a long time to

dispose considering that they are mostly non-biodegradable. Indeed, in light of this, it is important that decision-makers must consider the diversity of the waste produced in Riyadh when drawing up sustainable ways of waste management.

- *Water resource management*

Respondents also noted that the government should improve on water resource management lest the resources are depleted. One of the respondents (A14) stated that water scarcity is the biggest threat to the world currently – particularly in Riyadh.

> *"Shortage of water and international indicators which threaten the world in water issue and the drop of water level in KSA as well as operating more than 20 desalination plants, but still there is a shortage in water in KSA and particularly in Riyadh city" – Academic (A14).*

By virtue of its dry climate, it is inevitable that Riyadh should experience water scarcity. The government needs to move fast to ensure that groundwater sources are not depleted even as the demand for water continues to increase (GAMEP 2017). Furthermore, GAMEP (2017) points out that the public should be enlightened on the need to consume water wisely to avoid aggravating the already scarce levels of water.

6.5.3.3. Historical factors

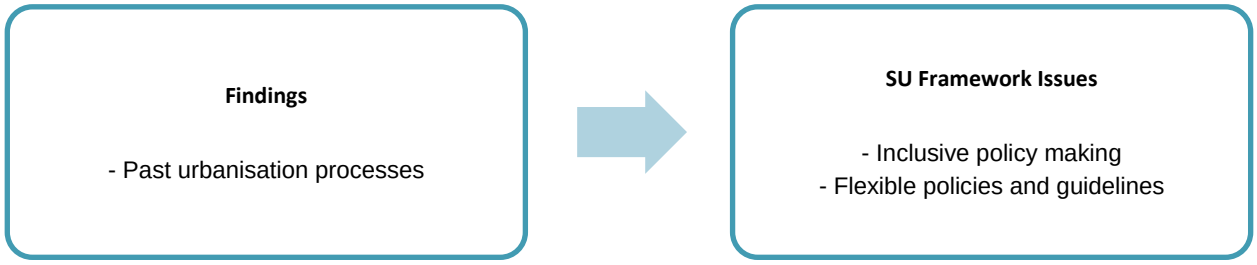


Figure 6-41: Interview process of Riyadh residents on the historical factors affecting sustainable urbanisation

- *Past urbanisation processes*

Most of the academics interviewed criticised past urbanisation processes stating that they had set a bad precedence insofar as urban planning is concerned. They further noted that some of these urban plans will have to be discarded in place of newer ones influenced by sustainability. One of the respondents (A9) pointed an accusing finger at Doxiadis, which produced the first master plan for the city, as being responsible for social segregation of Riyadh.

> *"Neighbourhood was a mixture of all the categories of the community, therefore, the planning of Doxiadis depended on dividing Riyadh into categories thinking that this waste*

community of Riyadh but it was untrue because the Arabic neighbourhood includes all the categories of the community and it has a clear center and thus Riyadh was not planned properly" – ***Academic (A9).***

According to Garba (2004) the hiring of Doxiadis Associates signalled the beginning of planned development of Riyadh, which was kick-started by the development of a master plan. This master plan, notwithstanding, urban challenges, such as rapid population growth, strain on public services and lack of capacity of municipality officials, were still prevalent. Furthermore, the population growth of Riyadh outpaced the one that had been projected by Doxiadis' master plan thus there was a need for another master plan that reflected the reality.

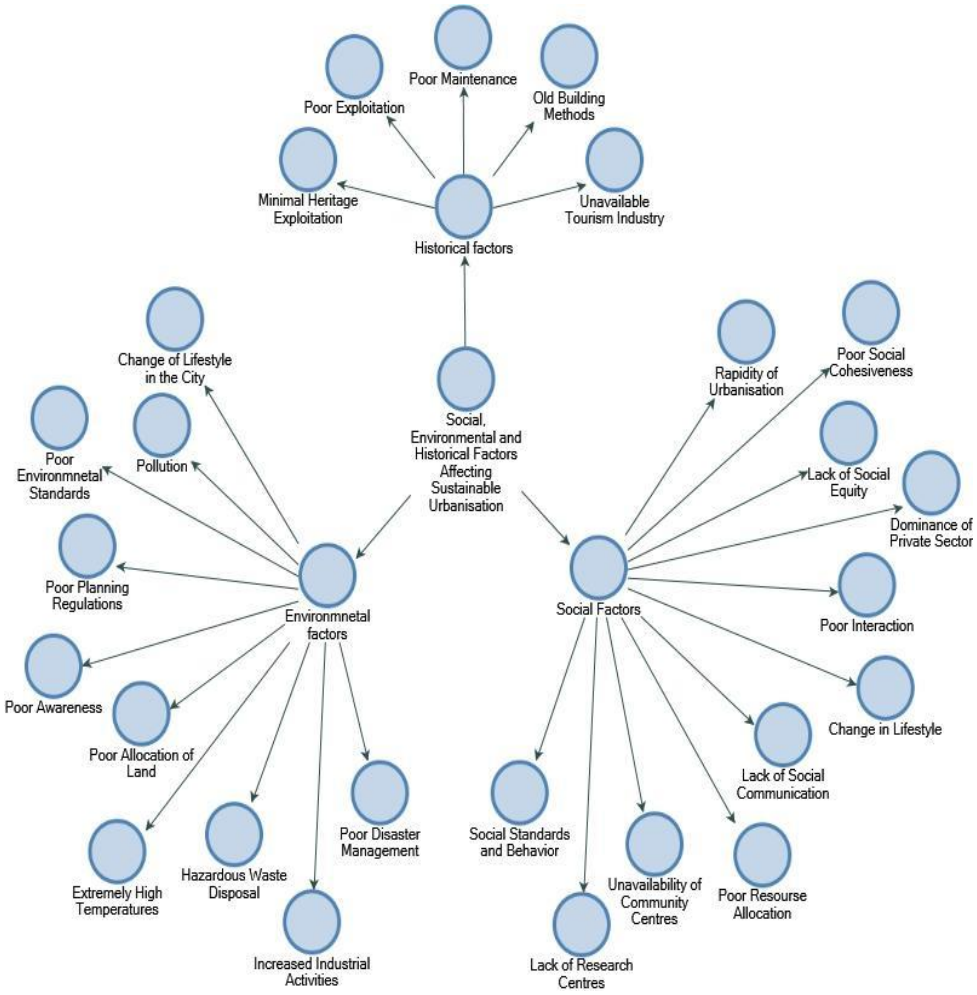


Figure 6-42-1: Relationships in theme Social, Environmental and Historical Factors

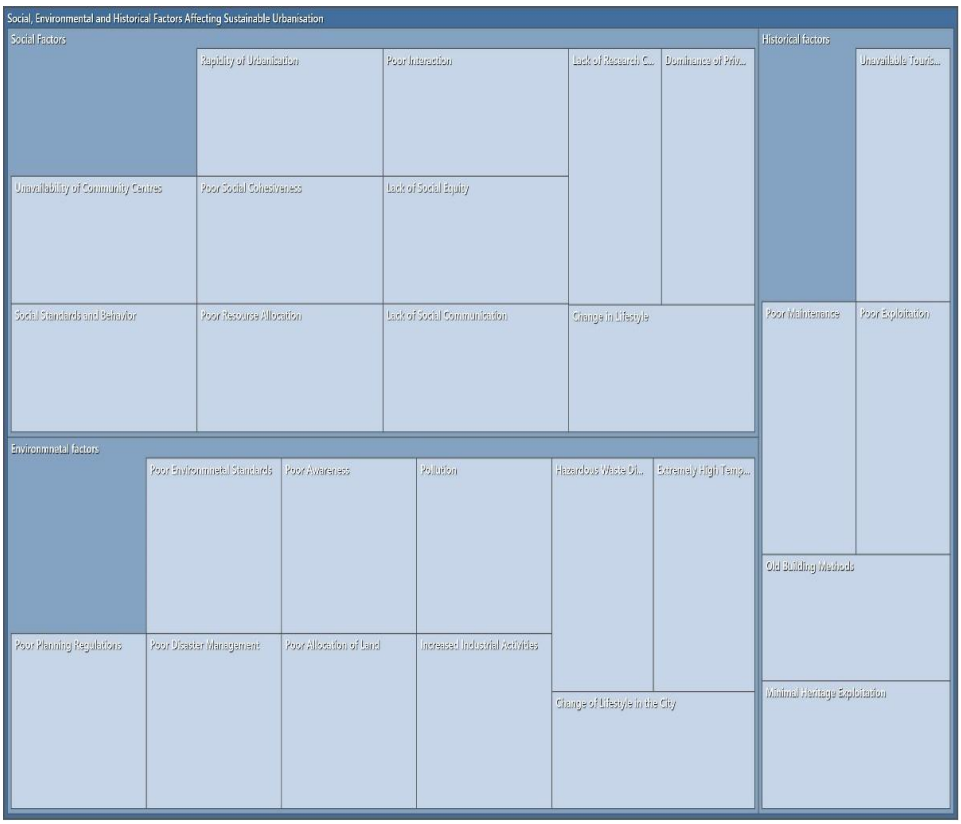


Figure 6-42-2: Hierarchy in theme Social, Environmental and Historical Factors

6.5.4. Impact of Rapid Urbanisation on Desert and Arid Land

The respondents identified various social and environmental impacts of rapid urbanisation on desert and arid land (See figures 6-44-1/6-44-2 and Figure 6-43).

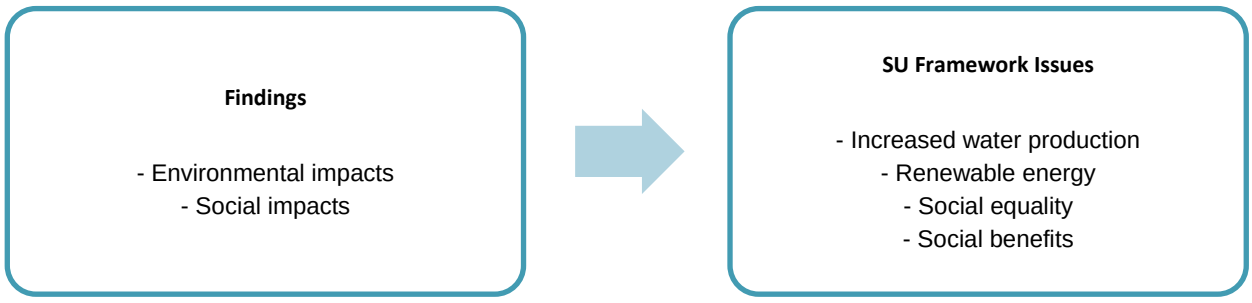


Figure 6-43: Interview process of Riyadh residents on the impact of rapid urbanisation on desert and arid lands

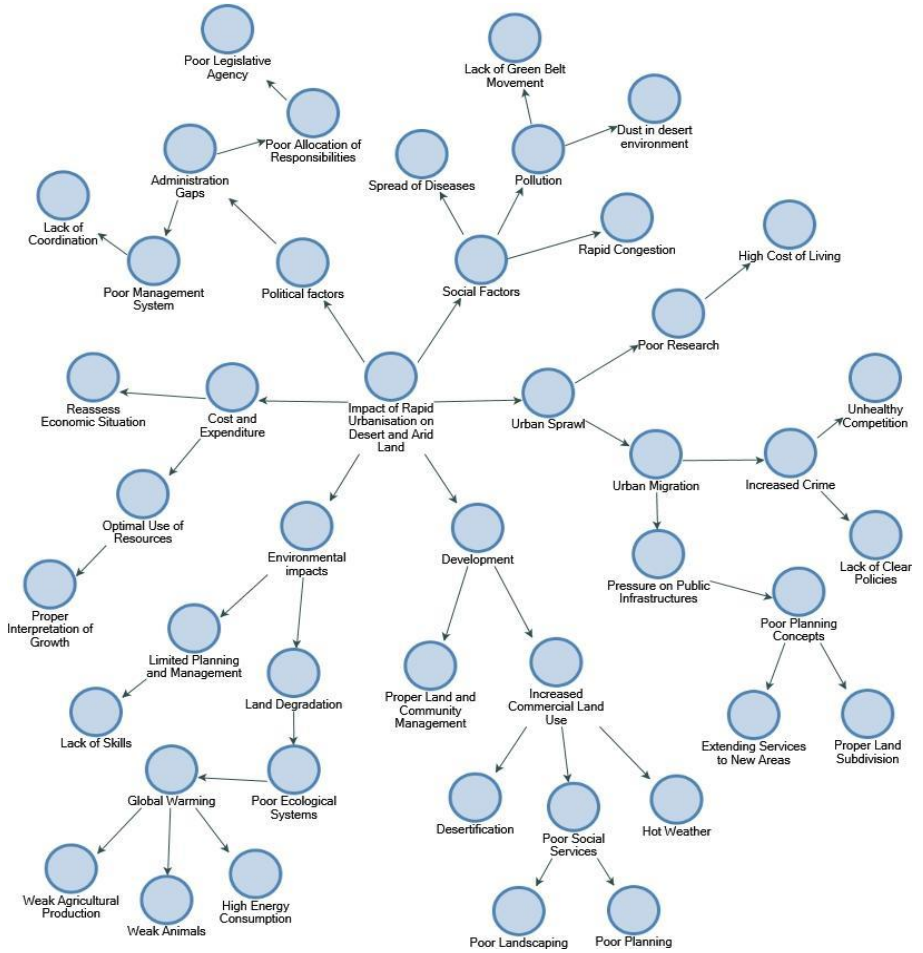


Figure 6-44-1: Relationships in theme Impact of Rapid Urbanisation on Arid Land

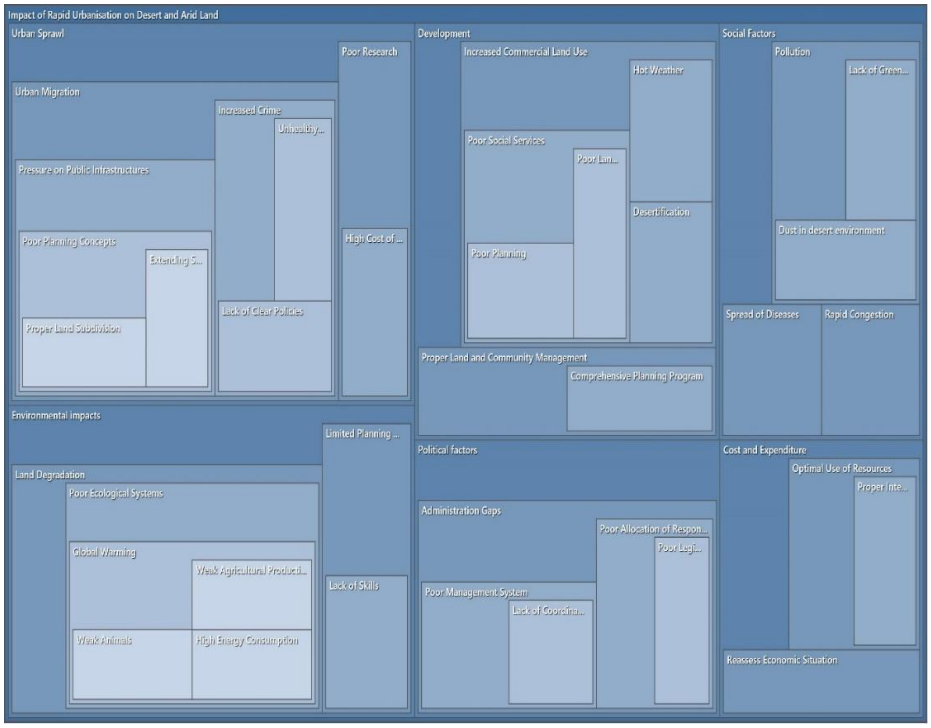


Figure 6-44-2: Hierarchy in theme Impact of Rapid Urbanisation on Arid Land

- *Environmental impacts*

The respondents listed deteriorating waste management and reduced water resources as some of the environmental impacts of rapid urbanisation on desert and arid land. According to most academics, rapid population growth has increased the consumption of water, which may result in depletion of the water resources. One of them (A4) warned that imposing taxes on water consumption may not be the solution.

> *"Consumption of water is high and not sustainable, and I think taxes imposed by the government are not the solution for the community but they are solution for the private sector, and the community should be aware of this aspect" –* ***Academic (A4).***

GAMEP (2017) warns that the increasing demand for water will negatively impact water and food security as well as energy security. In lieu of this, it is important to keenly look at the high population growth and the increased per capita water consumption. As a plausible solution, the respondent (A4) goes further and proposes an integrated management system as a way of curbing the crisis occasioned by the high demand for water.

> *"Municipalities and local governments in Riyadh are faced with serious water resources shortages, as well as the management of water resources. Therefore, the role of local authorities to develop an Integrated management system of water resources, establish recycling facilities to settle this sever problem" –* ***Academic (A4).***

An integrated management of water resources deviates from the norm in Saudi Arabia where water resources have not been prudently managed despite the kingdom being located in an arid region. For example, irresponsible irrigation practices have helped accelerate water scarcity levels in the kingdom (DeNicola et al. 2015). Similarly, GAMEP (2017) acknowledges the importance of an integrated management of water resources in creating between the balance and supply of water resources. This can be achieved by fulfilling the long and short-term needs of all sectors as far as water resources are concerned, in addition to reducing pollution of water resources.

Regarding waste management, the predominant opinion among the experts and researchers is that rapid urbanisation will worsen waste management as far as desert and arid lands are concerned. For example, one of the respondents (A3) noted that the local government is overwhelmed in the provision of sewage facilities and water treatment plants.

> *"Inadequate sewage facilities and water treatment plants. Municipalities and local governments in Riyadh are faced with serious resource crisis in the management of water sources and sewage facilities" –* ***Academic (A3).***

One of the reasons for poor waste management in Riyadh has been the use of outdated methods of waste management by the local government (Anjum et al. 2016). Most of the landfills are operating beyond their capacity whereas the local government does not have any more space for creating new landfills. Proper waste management also has to start through formulation of regulations to enhance or guide the implementation of sustainable waste management methods. Inefficient industrial and hazardous waste regulations have compounded waste management challenges.

- *Social impacts*

The social impacts mentioned by the respondents include demographic changes, increased population and urban expansion. Most academics interviewed attributed the expanding urban boundaries in Riyadh to the increasing population in the city. For example, one of the respondents (A10) warned that the increased population would eventually put pressure on public services and infrastructures.

> *"Population growth, urban expansion and pressures on public services and infrastructures," –* ***Academic (A10).***

The strain on public infrastructures has been manifested in the case of the road network, which has been afflicted by traffic congestion. As at 2015, the average daily vehicular trips were peaking at 7.4 million, a figure which is projected to rise to 12 million in the next 15 years (ADA 2015). This has necessitated the construction of more roads, including feeder roads to accommodate the increasing number of cars on the roads occasioned by increasing population.

Unlike before the oil boom when the demographic composition of Riyadh was Arabic, the demographic composition now includes a significant number of expatriates from other countries. One of the respondents (A1) noted this change in demographic composition.

> *"Changes occurred in the community as well as the urban sprawl" –* ***Academic (A1).***

The main reason for the change in the demographic composition of Riyadh is attributable to influx of international migrants who have come to the city for work purposes. Foran et al. (2014) reveals that there are over seven million foreign workers in KSA. The General Authority on Statistics (2018) further notes that there were approximately over 12 million non-Saudis as at 2018.

6.5.5. Challenges in Planning for Sustainable Urbanisation

Respondents identified the following challenges that may inhibit sustainable urban planning in Riyadh (See figures 6-46-1/6-46-2 and Figure 6-45).

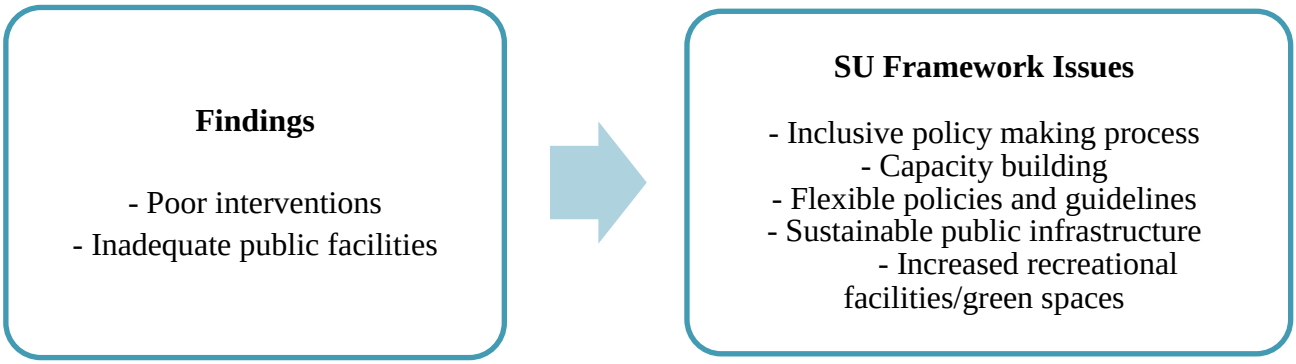


Figure 6-45: Interview process of Riyadh residents on challenges in planning for sustainable urbanisation

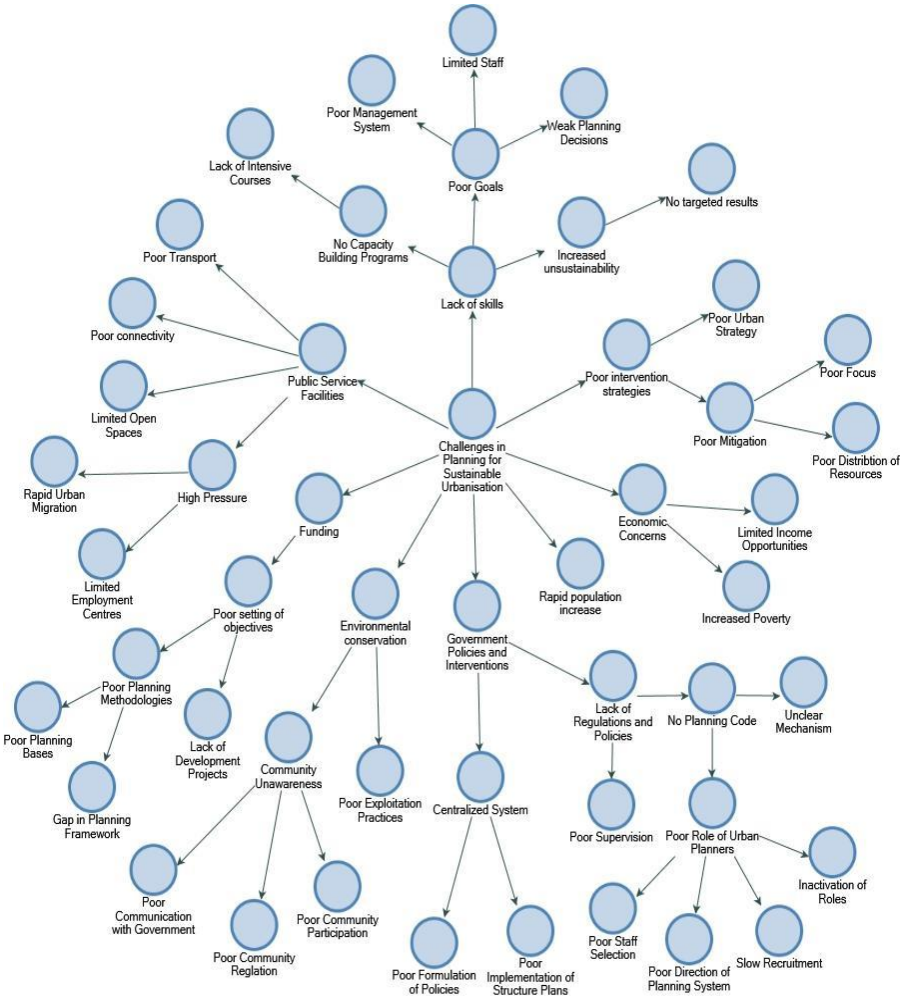


Figure 6-46-1: Relationships in theme Challenges in Planning for Sustainable Urbanisation

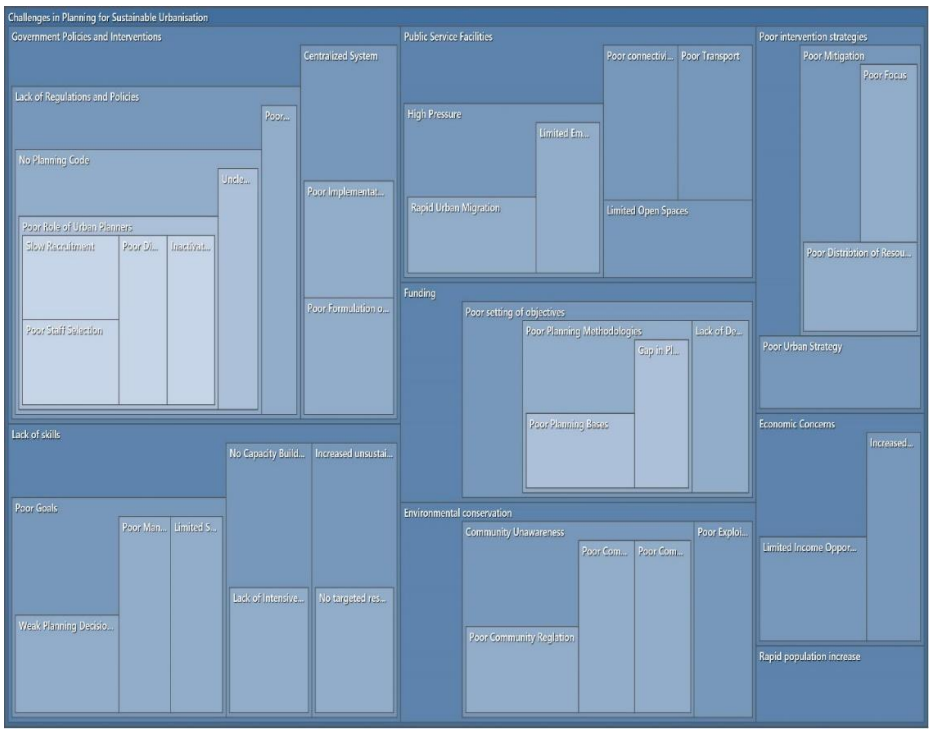


Figure 6-46-2: Hierarchy in theme Challenges in Planning for Sustainable Urbanisation

- *Poor interventions*

Most respondents decried the fact that urban planning agencies are notorious for coming up with poor interventions, such as land use allocation, poor expertise and skill as well as policy formulation. One respondent (A5) accused developers for lacking requisite skills and experience for urban planning.

> *"Developers, who have no enough experience and know nothing about sustainable urbanisation and urban planning, and they only think about profits and revenues, therefore planning and development should be assigned to specialists and experts" –* ***Academic (A5).***

Lack of expertise is an issue that has affected Riyadh since the oil boom phase. The enlistment of Doxiadis and SCET to develop a master plan for the city was based on the fact that there were no qualified experts from within to draw up a master plan that would lay the marker for an orderly urban planning (Garba, 2004). This problem persists until today where most urban planners are not knowledgeable on modern technologies for urban planning. Future Saudi Cities Programme (2016) reiterates on the need for municipal authorities to liaise with academic institutions for refresher courses on urban planning.

As a form of poor government intervention, many respondents felt that most urban planning policies are redundant and not relevant to the prevailing circumstances of urbanisation. One such

respondent (A13) compared the land use regulations in the Western countries to those in Saudi Arabia and noted that the former is more orderly than the latter.

> *"Subdivisions in western countries are planned in good manner which is compatible with nature of the land and a mixture of engineering forms, but when you see Riyadh through satellites, you become astonished from the latitude and longitude as if it is divided by a ruler, this is not planning as considered by current Saudi planners, it is division and cutting of land with no consideration to provide an environment appropriate to the human beings and with no integrated services" –* ***Academic (A13).***

This sentiment brings to mind the Real Estate Development Fund (REDF), which was part of a policy in which the central government provided citizens with loans to build houses. At the same time, residents were given free land on which to build these residential infrastructures. This policy proved counterproductive as it created a huge headache in terms of the management of spatial growth and instead propagated rapid urban expansion in which many people rushed to build houses in the suburbs of the city.

Another area in which the government has performed poorly – as per the perceptions of the experts and researchers – is building the capacity of their employees. The respondent (A15) further added that the central and local governments have not paid much attention to monitoring the performances of their employees.

> *"The government employee and his job is not like companies which give incentives and support, therefore, you find sub-municipalities staff doesn't care about their performance and does its work effectively, so the government system is good for accountability and the companies system is good for field work" –* ***Academic (A15).***

One area in which the capacity of urban planners needs to be improved is waste management (GAMEP 2017). They need to move away from dependence on landfills, which pose a health risk to the environment and people especially in the case of non-biodegradable waste, such as plastics.

- *Public service facilities*

Respondents also noted that the public service facilities are inadequate for serving the needs of all people. One respondent (A20) described how the public transport system has been hampered by poor land allocation strategies that have subsequently hindered the efficient distribution of public services to all parts of Riyadh:

> *"Public transport is considered to be one of the basic needs of the city because it connects all parts of the city together, and this process requires to encourage strong land use*

policies in the city because if we had proper regulations of land use, then we would have good and enough public services and infrastructures provided to all parts of the city" – ***Academic (A20).***

One of the solutions mooted for easing the strain on the road network has been the development of a public transport system. This has been actualised through the development of King Abdulaziz Project for Public Transport, which seeks reduce residents' overreliance on private cars. This 176-kilometre metro system will improve accessibility of many areas in Riyadh and enable cheaper and quicker travel for many residents (ADA 2015).

The fact that little attention has been paid to the establishment of open spaces, playgrounds, recreational facilities and parks was mentioned by some of the respondents as a reason for citing public service facilities as an impediment to sustainable urbanisation. The following is a comment from one of the respondents (A14).

"They didn't consider the establishment of open spaces, recreational facilities, playgrounds, gardens and parks in some residential areas" – ***Academic (A14).***

These residential areas that he refers to could be newer neighbourhoods mentioned by Almayouf (2013) in which he notes that these neighbourhoods have poor walkability compared to the traditional older neighbourhoods that were established before urbanisation gathered pace. The fact that the newer neighbourhoods have poor walkability and minimal open spaces is an indicator of how the urban planning process has prioritised the use of land for residential properties and commercial properties at the expense of recreational facilities and open spaces.

6.5.6. Integration of Sustainable Urbanisation into Future Development

The academics interviewed provided the following suggestions on how sustainable urbanisation can be integrated into future development (See figures 6-48-1/6-48-2 and Figure 6-47).

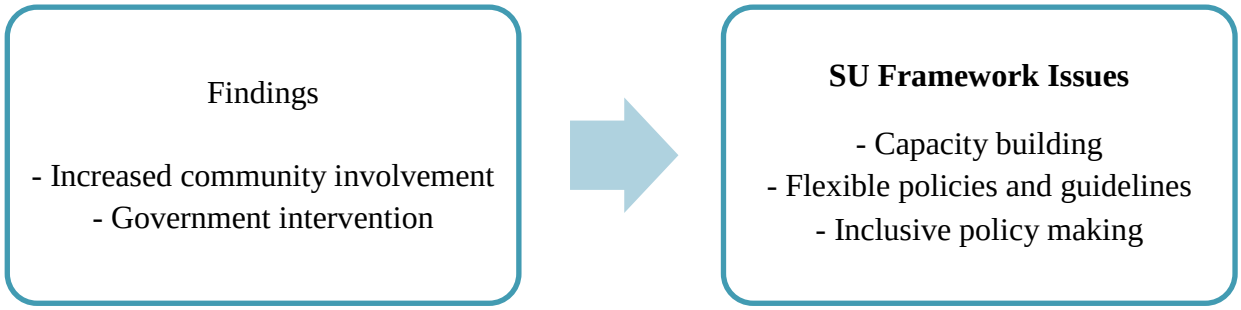


Figure 6-47: Interview process of Riyadh residents on integration of sustainable urbanisation into future development of KSA cities

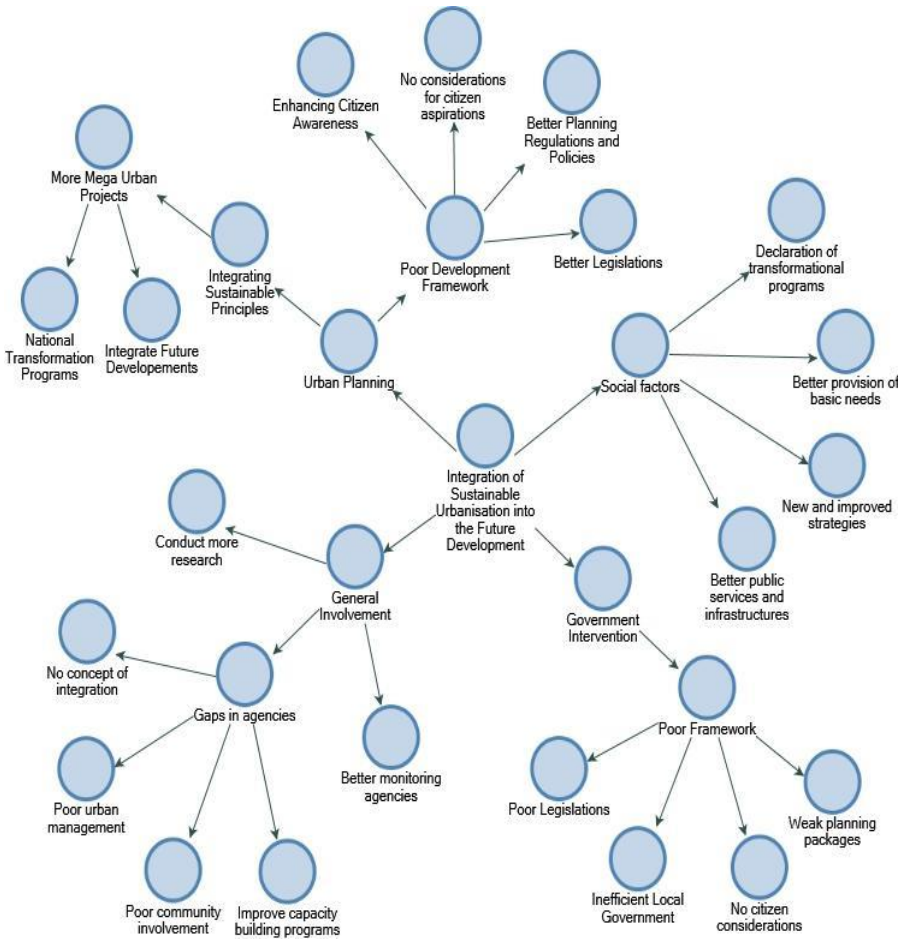


Figure 6-48-1: Relationships in Integration of sustainable into the Future Development

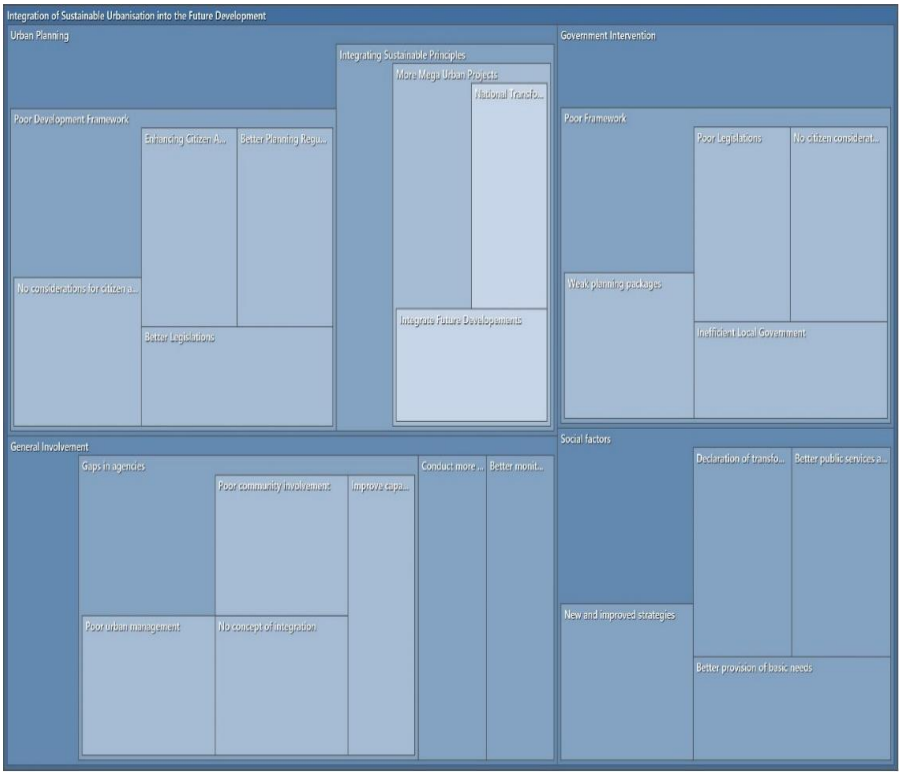


Figure 6-48-2: Hierarchy in Integration of sustainable into the Future Development

- *Increased community involvement*

Most respondents advised that sustainable urbanisation can be ingrained into future development projects through increased community involvement. When probed further, the respondents noted that sustainable urbanisation should commence from the grassroots where members of the public should be the main stakeholders. The following is a comment by one of the respondents (A10) who proposed the establishment of community centres.

> *"Establish community centers in residential areas, which will play an important role to facilitate sustainability among communities, and there should be social events and activities carried out weekly or monthly to enhance sustainable communities" –* ***Academic (A10).***

The aforementioned sentiments resonate with the vision of the Deputy Crown Prince of KSA who has envisioned an increased engagement with the local community as part of Saudi Vision 2030. Al-Surf and Mostafa (2016) note that this vision has been actualised through the establishment of civic or community councils meant to foster a relationship between the public and private sectors in a bid to attain the objectives of the 2030 vision.

Other respondents warned that community involvement in sustainable urbanisation must be proactive and not passive. One of these respondents (A2) suggested certain activities that members of the public should participate in with regards to sustainable urbanisation.

> *"We have not to forget the environment and the community and ensure their participation in evaluation and consider the social and environmental dimension, and this effort is often done by mass media which provides the awareness to the community in form of doses over the time to understand it," –* ***Academic (A2).***

Al-Barrak et al. (2016) bemoans the poor engagement between citizens and the government regarding public service projects in Riyadh as well as in the whole of Saudi Arabia. This is notwithstanding the fact that the Saudi government has adopted the e-government technology to enable citizens communicate their concerns and suggestions on various public service projects that the government is undertaking. Instead, it has been a one-way communication in which the government has been communicating information to the citizens without any feedback from the latter (Al-Barrak et al. 2016).

- *Government intervention*

According to most of the respondents, sustainable urbanisation can be integrated into future development through better government interventions or strategies. Some of the interventions that

were mentioned include better policies related to sustainable urbanisation, development of better housing, economic diversification and better land use allocation strategies. Regarding economic diversification, the general mood was that the country should not rely on oil as the sole source of revenue. One of the respondents (A13) proposed that the government should replace the use of oil with renewable energy.

> *"New alternatives for oil to diversify the revenues sources which is based on Vision 2030 goals and the national transformation program. Also, I propose that our government should think about new industries, renewable energy, and modern technologies"* – ***Academic (A13).***

On the economic front, one of the hallmarks of NTP 2020 and Saudi Vision 2030 is to move away from a reliance on oil as a source of income and a move towards an economic diversification into private sector development and human capital. The overdependence on oil may have boosted Saudi's economy but has also been a source of air pollution resulting from emissions from fossil fuels. This heightens the need for more investment in renewable energy (GAMEP 2017).

6.6. Conclusion

The following key points have emerged from an analysis of the interviews with the three categories of respondents:

i. Barriers and drivers of sustainable urbanisation

- Barriers

A comparison of the findings of the main study interviews with the three categories of respondents show that poor urban planning is a constant feature among the respondents insofar as the barriers to sustainable urbanisation are concerned. Among the urban planning experts/officials, this poor urban planning process manifests itself through poor government supervision, whereas among Riyadh residents, the same is reflected through haphazard urbanisation.

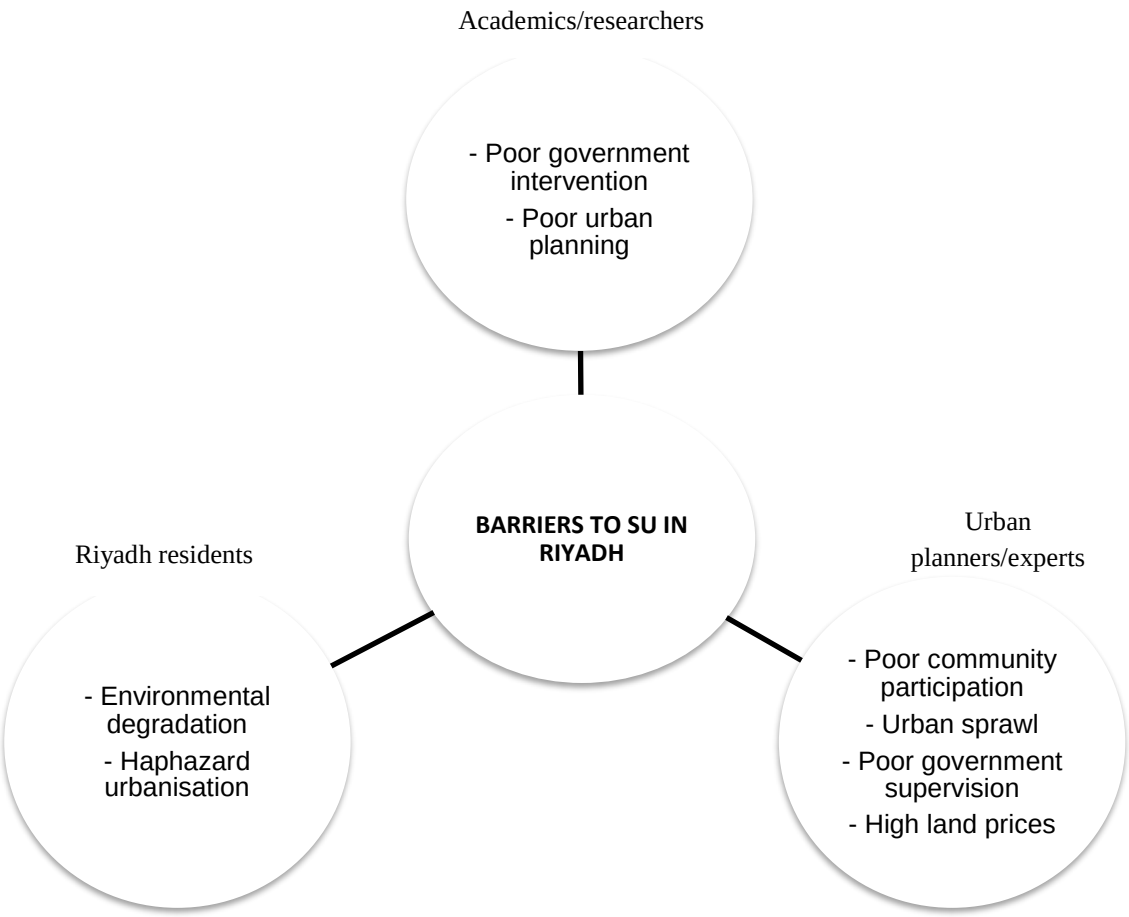


Figure 6-49: Findings on barriers to SU in Riyadh for the three categories of respondents

- Drivers

As can be seen from the findings on the drivers of sustainable urbanisation, there is consensus among the three categories of respondents that government involvement is a key driver of sustainable urbanisation. Likewise, the dominant perception among Riyadh residents and urban planning experts/officials is that the economic boom in KSA is another integral driver of sustainable urbanisation.

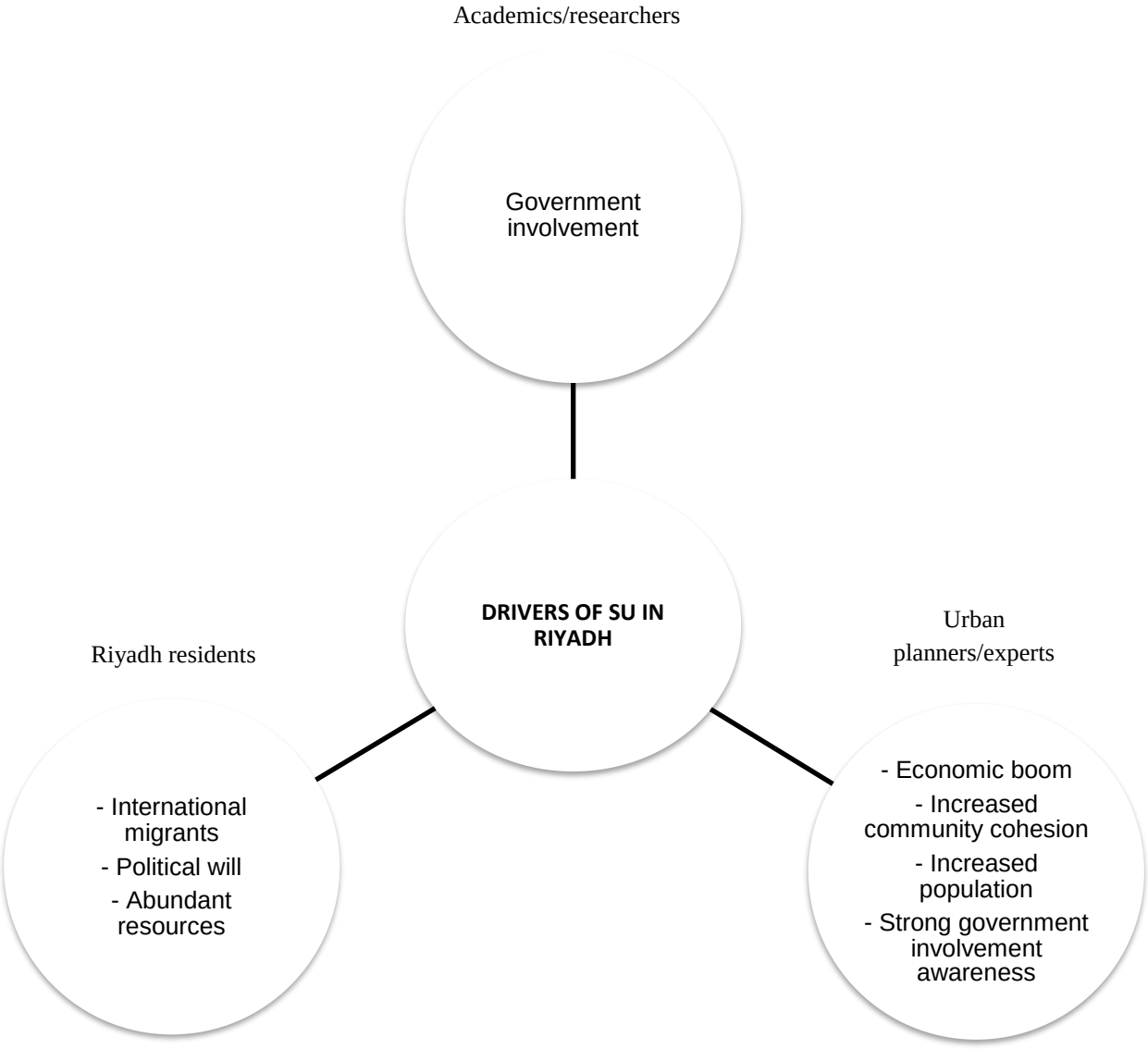


Figure 6-50: Findings on drivers of SU in Riyadh for the three categories of respondents

ii. Improving the quality of life

A comparison of the findings from the three categories of respondents reveals that improved conditions of living is the key benefit that will accumulate from the integration of sustainable practices in the urban planning process. In particular, academics/researchers perceive improved social conditions as a key benefit of sustainable urbanisation. This perception encompasses all the other benefits mentioned by other categories of respondents, including, increased job opportunities, improved public infrastructure, equal resource distribution, better housing and better urbanisation policies, among others.

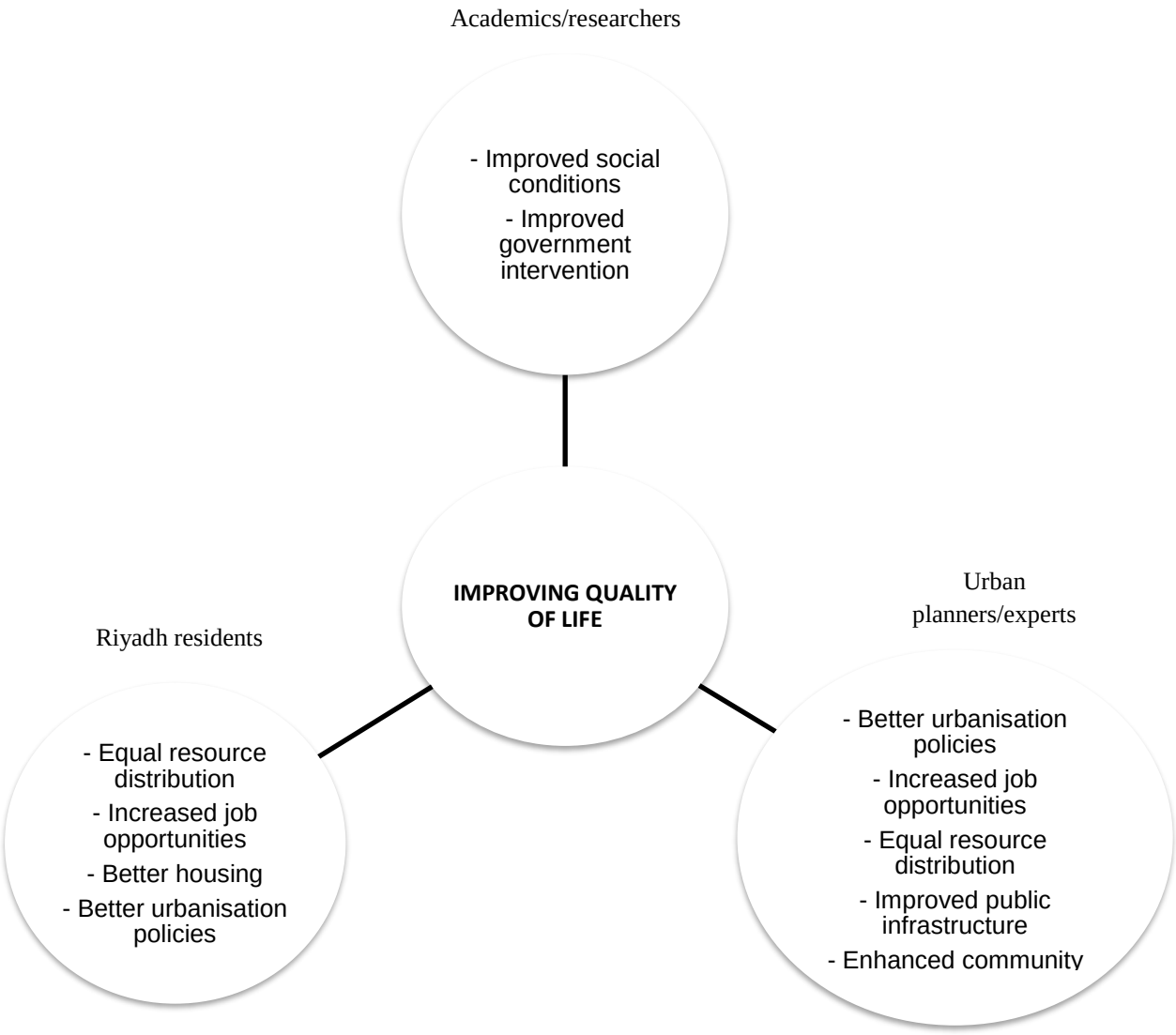


Figure 6-51: Findings on improving the quality of life for the three categories of respondents

iii. Social, environmental and historical factors affecting sustainable urbanisation in Riyadh

- Social factors

The three categories of respondents have differing perceptions on the social factors that affect sustainable urbanisation in Riyadh. Nonetheless, a recurring social factor is the social cohesion among Riyadh residents and stakeholders. Among urban planning experts/officials, poor social cohesion is perceived as a key social factor affecting sustainable urbanisation. Conversely, most academics/researchers perceive social inequality as a social factor affecting sustainable urbanisation.

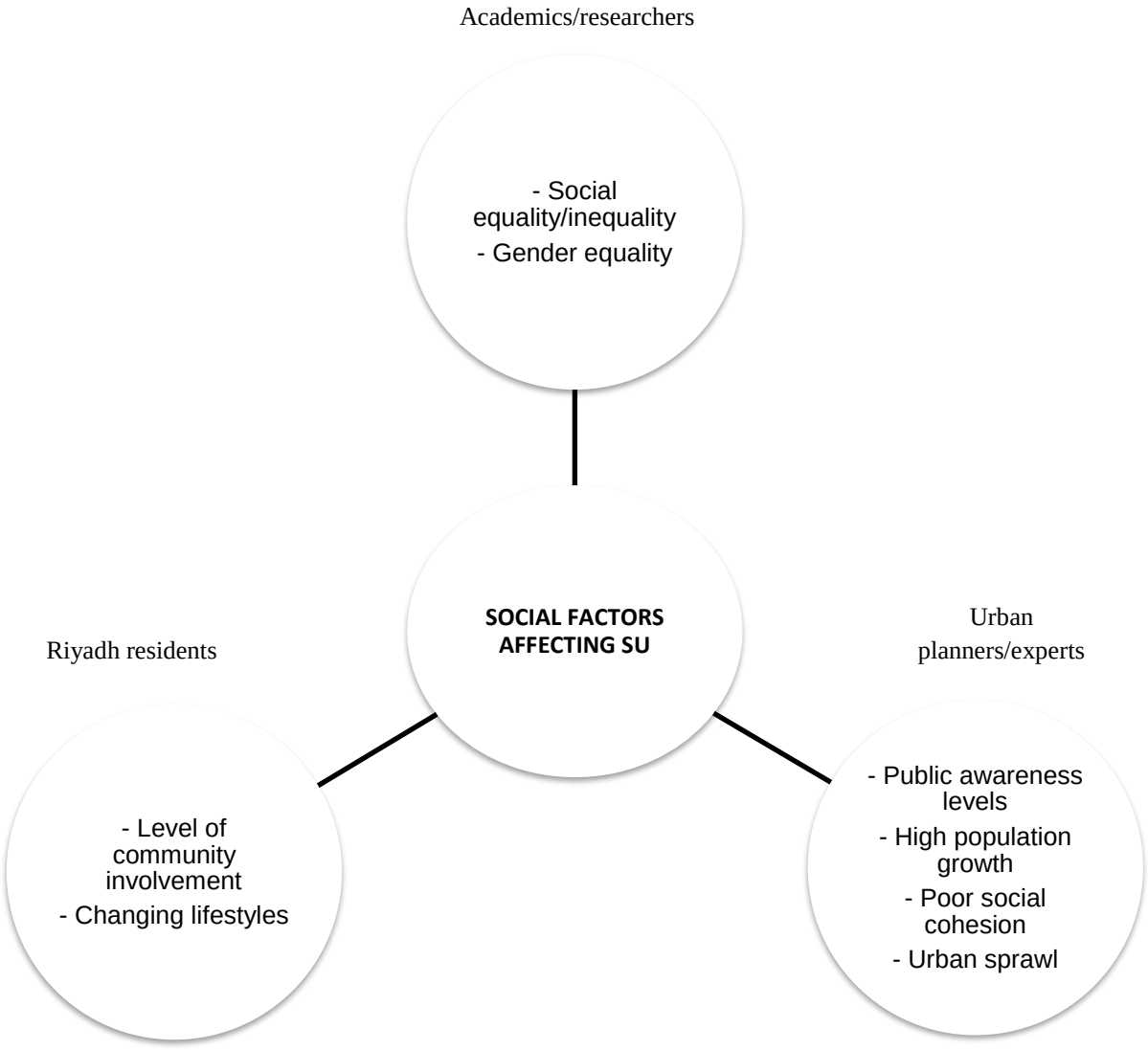


Figure 6-52: Findings on social factors affecting SU for the three categories of respondents

- Environmental factors

As can be seen in the findings among the three categories of respondents, water resource management and waste management are two recurring environmental factors that will influence sustainable urbanisation. Across the three categories of respondents, the consensus was that Riyadh has been grappling with water scarcity and poor waste disposal; two issues that stakeholders of urban planning should come up with strategies to mitigate against.

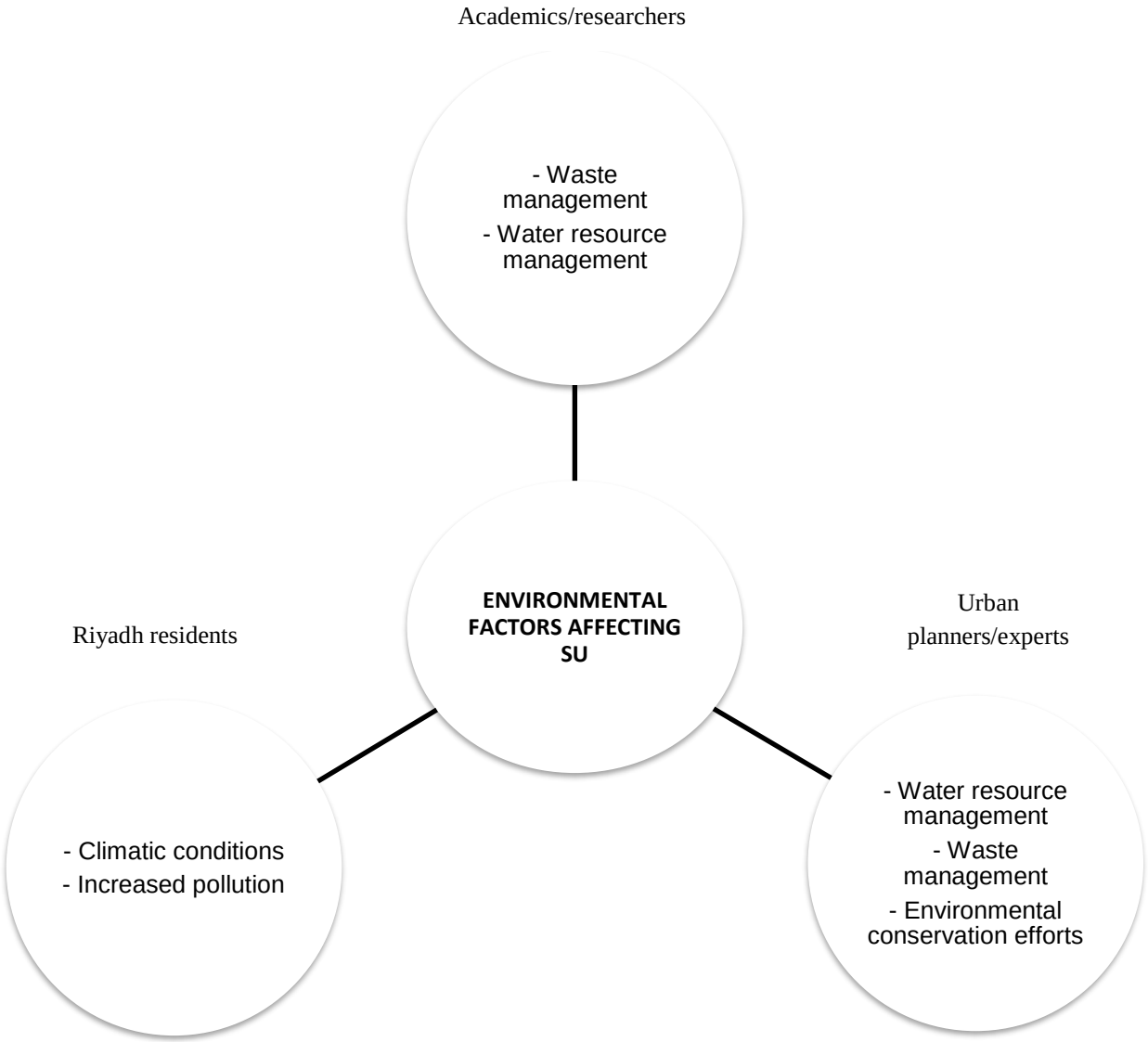


Figure 6-53: Findings on environmental factors affecting SU for the three categories of respondents

- Historical factors

Not much comparison can be made among the three categories of respondents regarding the historical factors affecting sustainable urbanisation. Each category of respondents had different perceptions on the historical factors affecting sustainable urbanisation.

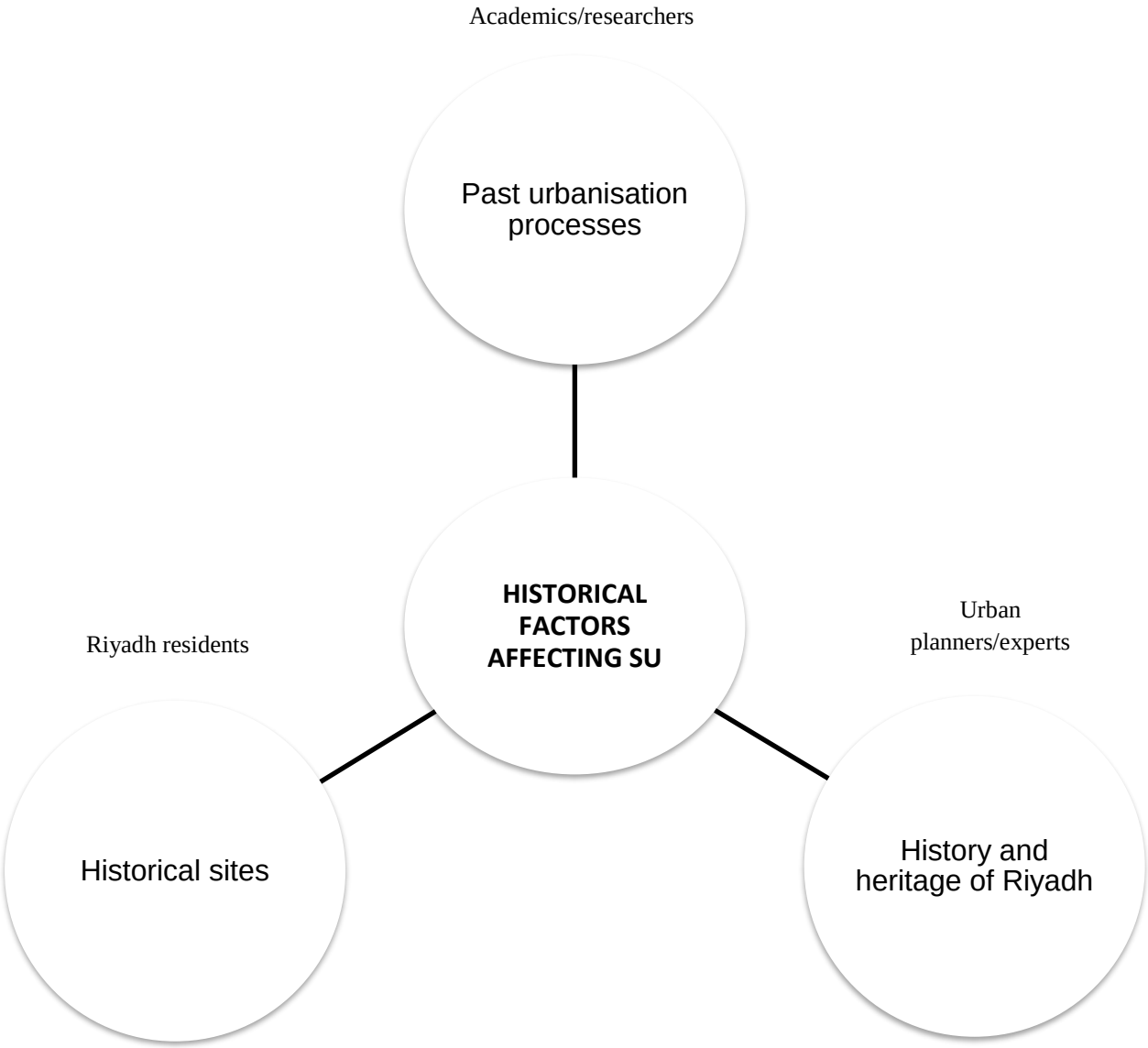


Figure 6-54: Findings on historical factors affecting SU for the three categories of respondents

iv. Challenges in planning for sustainable urbanisation

As indicated in figure 6-55, there is consensus among Riyadh residents and urban planning experts/officials that poor coordination among urban planners is a key challenge in planning for sustainable urbanisation. Similarly, academics/researchers and Riyadh residents agree that inadequate public facilities is a challenge in planning for sustainable urbanisation.

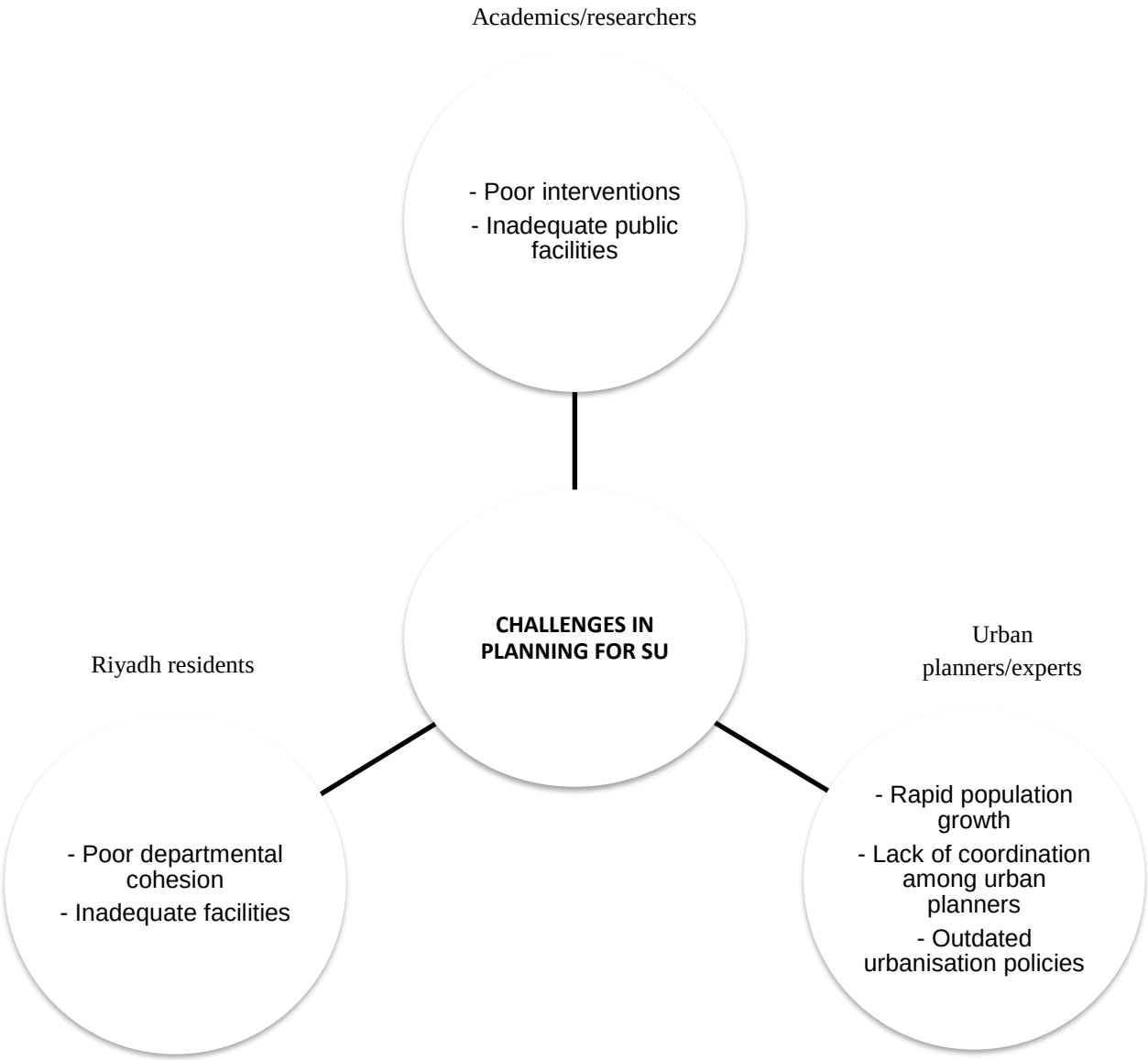


Figure 6-55: Findings on challenges in planning for SU for the three categories of respondents

v. Impact of rapid urbanisation on desert and arid lands

An analysis of the three categories of respondents (figure 6-56) shows that the impacts of rapid urbanisation on desert and arid lands have been environmental and social in nature. The environmental impacts include natural hazards, increased pollution, environmental degradation and changes in land use. On the other hand, the social impacts comprise increased urban population and strained infrastructure.

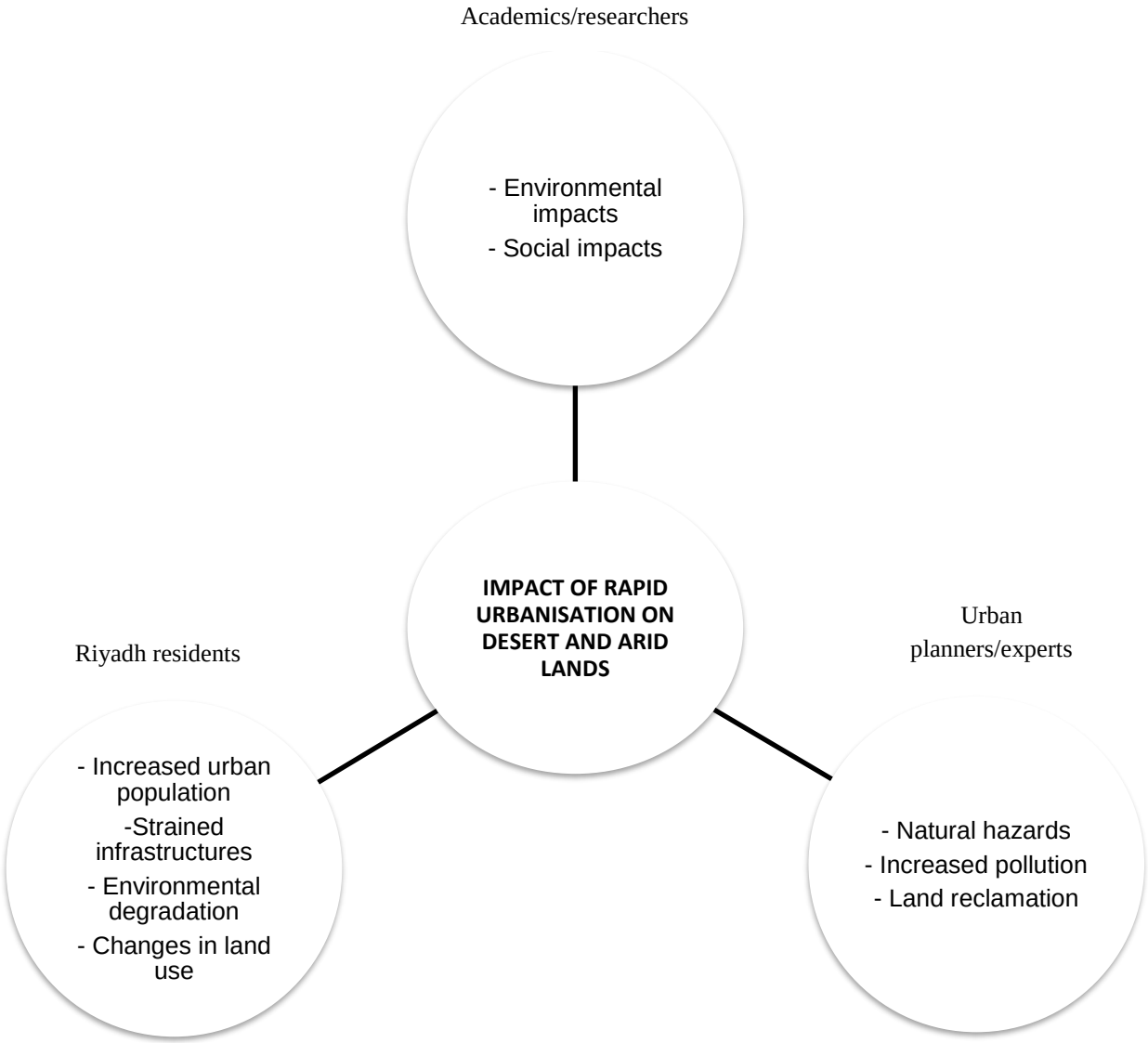


Figure 6-56: Findings on impacts of rapid urbanisation on desert and arid lands for the three categories of respondents

vi. Integration of sustainable urbanisation in future development in KSA cities

According to most respondents in the three categories of respondents, increased citizen or public participation is integral to the integration of sustainable urbanisation in future development in KSA cities (figure 6-57). Furthermore, most urban planning experts/officials and Riyadh residents agree that better urban planning strategies and policies are necessary for effective integration of SU into future development.

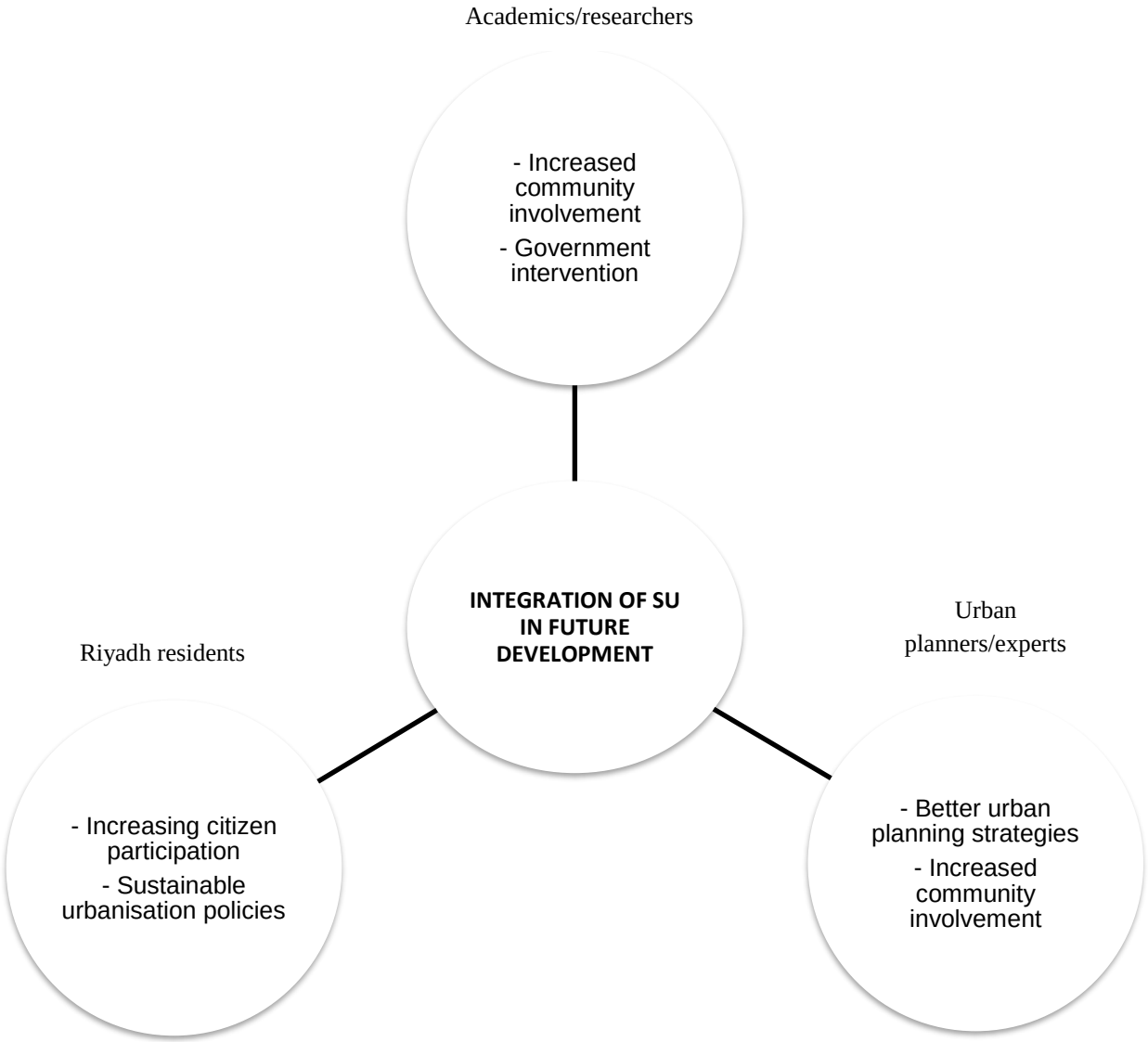


Figure 6-57: Findings on integration of SU in future development for the three categories of respondents

CHAPTER 7: DEVELOPMENT OF SUSTAINABLE URBANISATION IN RIYADH (PROPOSED FRAMEWORK)

7.1. Introduction

Riyadh has established itself as the epitome of rapid urbanisation as far as the Middle East is concerned. The oil boom propelled it from a simple traditional village to a megacity that is increasingly attracting millions of migrants from other parts of Saudi Arabia and other foreign countries. As at mid-2017, the population of the city had peaked at over 8.2 million people; out of this number, over 3.6 million are international migrants (General Authority on Statistics 2017). However, its rapid urbanisation has been a haphazard one that has created various challenges, such as lack of affordable housing, air pollution and traffic congestion, among others. These problems have been compounded by the lack of relevant policies and legislations to guide the urbanisation process.

One of the objectives of this study was to develop a framework for sustainable urbanisation and sustainable living in desert cities – in this case, Riyadh. Its main objective is to point stakeholders of urban planning in Riyadh towards the right direction concerning the sustainability processes and strategies that are necessary for the development of a sustainable community. The stakeholders include Riyadh residents, government urban planning officials at the regional, municipal and national level as well as academia/researchers, among others. The framework was identified by the sustainable urbanisation-related issues identified through the interviews conducted with the three categories of respondents namely, Riyadh residents, government officials/urban planning officials and academics/researchers. The framework consists of five dimensions/factors: physical, social, economic, political and environmental. Subsequently, this chapter details the development of the sustainable urbanisation (SU) framework by expounding on the issues identified by the three categories of respondents insofar as sustainable urbanisation is concerned.

7.2. Physical dimension

The physical dimension or factors of sustainable urbanisation focused on the issues that were identified by the respondents insofar as the physical outlook of Riyadh is concerned. Following interviews with the respondents, the study identified the following key issues (Figure 7-1) as the physical factors that would influence sustainable urbanisation in Riyadh.

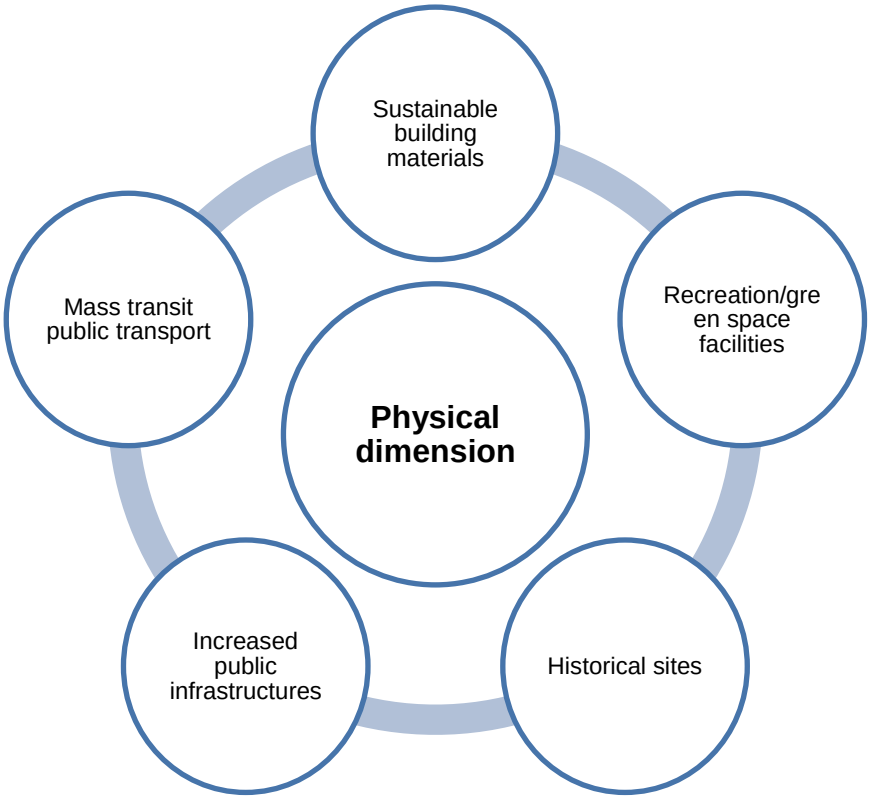


Figure 7-1: Physical factors of sustainable urbanisation as identified by the respondents

7.2.1. Mass transit public transport

One of the recurrent issues highlighted by the three categories of respondents was the need for a public transport system to ease the traffic congestion in the city. Traffic congestion has been the hallmark of the rapid urbanisation in Riyadh as more people invest in private cars. However, this has accelerated environmental pollution as the numerous number of cars result in increased greenhouse emissions. Peak hours are often characterised by a traffic gridlock that will undoubtedly worsen in the future as the population of Riyadh continues to increase. ADA (2015) projects that the number of vehicular trips per day will increase to 12 million in the next 15 years. This represents almost a 50% increase from the number of vehicular trips recorded in 2015 (7.4 million). A public transport system has been mooted as one of the solutions to the traffic congestion menace in the city. Furthermore, it would help reduce air pollution from emission of fossil fuels occasioned by the presence of many cars on the roads. Nonetheless, one of the key challenges to development of a mass transit public transport system is the cultural norms of Saudis, which prohibit the mixing of men and women in public places. Consequently, a public transport system would bring up issues of public decency.

7.2.2. Increased public infrastructure

Additionally, the need for more public infrastructures was raised by respondents in the three interview categories. Commendably, the Saudi government has made strides towards improving

public infrastructures, such as hospitals and schools, which have contributed to increased enrolment of young people in Riyadh and other areas in the kingdom. This was especially during the reign of King Fahd, during which the enrolment rates of females increased in proportion to that of males (Al Saud 2018). Nevertheless, the increasing rate of population necessitates the construction of more infrastructures to enable more people access essential services through equitable distribution of resources. Indeed, Mansour's (2016) study indeed confirms the need for the government to provide more health infrastructure in Riyadh. His study reveals that residents in the districts located away from the central parts of Riyadh Governorate experience difficulties in accessing health facilities. This is because there is a low density of health facilities in these districts compared to the central parts of Riyadh Governorate in which many health centres are clustered (Mansour 2016).

7.2.3. Increased recreation facilities and green spaces

One of the issues highlighted by many respondents was the lack of enough recreational facilities and green spaces in Riyadh. The respondents pointed out that the city does not have enough recreational parks where residents can relax or connect with one another. Indeed, Almayouf's (2013) study notes that Riyadh fares badly in the number of green space per capita compared to many cities globally. Notably, the lack of enough green spaces per capita is a challenge that is not only exclusive to Riyadh but is also synonymous with other desert cities in the world, such as Dubai (UAE) and Phoenix, Arizona in the United States. The World Cities Culture Forum (2019) notes that Dubai has a green space per capita of 2% along with other desert cities, such as Istanbul (2.2%) and Mumbai (2.5%). On the other hand, Phoenix boasts of an open space of 9%, which translates to 1.3 traditional city parks for every 10,000 residents (Ishcomer 2009). This figure places it lower than the national average of 3.9 traditional parks per 10,000 city residents. Increased recreational facilities will create more opportunities for residents of different calibre to socialise. Emphasis on green spaces will help preserve the natural vegetation cover of the city, such as the case of Wadi Hanifa valley. UNDP (2016) notes that investing in green spaces and recreational parks will also improve social cohesion within a city by bringing different residents together from varied socio-economic backgrounds.

7.2.4. Sustainable building materials

The shortage of housing in Riyadh was mentioned during interviews by many respondents. Most of these respondents noted that there has been an increased demand for houses occasioned by the rampant population increase in the city. Furthermore, many respondents decried the high cost of houses in the city. This has been occasioned by the high expenses incurred by developers in building residential properties. Most of the costs are directed towards the purchase of building

materials (Al-Surf et al. 2013). This issue brings to fore the use of sustainable building materials as a way of bringing down the costs of housing. Considering the long-term effectiveness of sustainable building materials, residential property developers will be able to cut down on the costs associated with erecting and maintaining a residential property. Consequently, they would not have to pass the high costs of developing houses to the consumers. The increased use of sustainable building materials is also necessary to safeguard the environment through the use of renewable energy systems, such as solar panels, which will help reduce the cost of electricity in the home.

7.3. Social dimension

The social dimension of the sustainable urbanisation framework refers to the social issues that are related to sustainable urbanisation. Respondents identified various social factors that would impact sustainable urbanisation in Riyadh. These factors – expounded upon in subsequent sub-sections – are outlined in Figure 7-2.

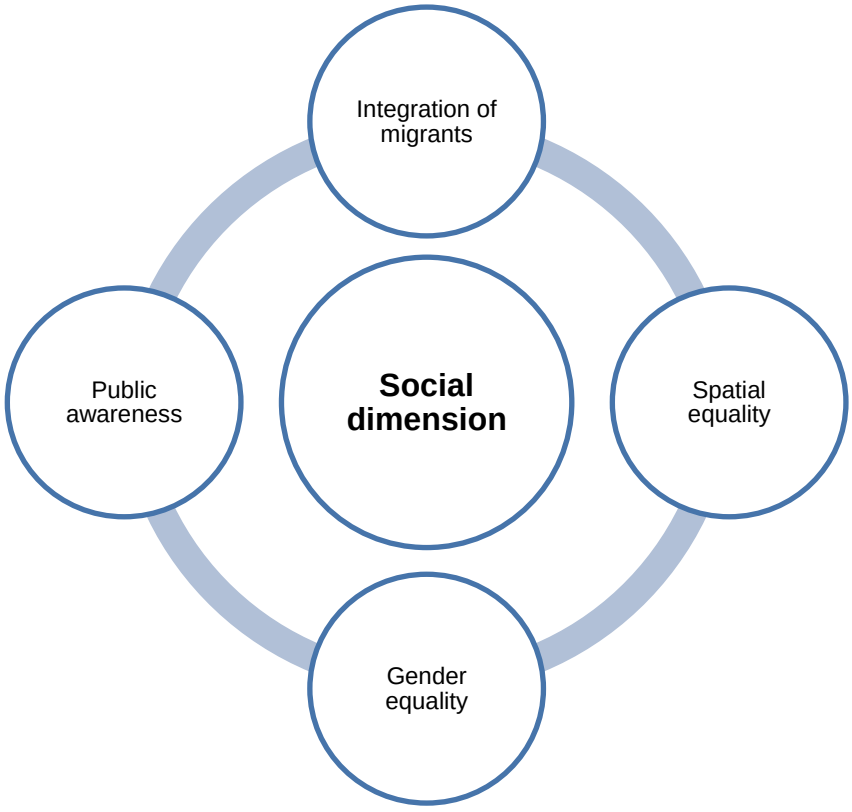


Figure 7-2: Social factors of sustainable urbanisation in Riyadh as identified by respondents

7.3.1. Public awareness programmes

For sustainable urban practices to take root there is need for members of the public to be involved. However, Riyadh residents can only participate actively in the adoption of sustainable urban practices when they fully understand the impacts of sustainable urbanisation. Indeed, Susilawati and Al-Surf (2011) note in their study that a majority of the residents interviewed were not

knowledgeable on sustainable urbanisation. Similarly, one of the key findings of the study was the low awareness levels among respondents on sustainable urbanisation. Public awareness programmes should target the residents using various avenues, such as municipality officials and the media. Municipality officials, for instance, can enlighten members of the public on the various efforts being undertaken by the government and the private sector as far as sustainable urbanisation is concerned. More recently, Alghamdi (2018) study reveals that most students in public universities are not knowledgeable on sustainable development. This implies the need to extend these awareness programmes to the universities by inculcating it into curricula. Public awareness programmes targeting all stakeholders of sustainable urbanisation will go a long way in enabling the kingdom achieve the goals of Saudi Vision 2030 that is aligned to the United Nation's (UN) agenda for sustainable development.

7.3.2. Spatial equality

One of the issues highlighted by many respondents with regards to the social dimension was the spatial inequality in Riyadh. The respondents bemoaned that certain areas of the city seem to enjoy better and more facilities compared to other parts of the city. Such sentiments brought to the fore the need for spatial equality in the city to enhance social cohesion among residents of different backgrounds. Indeed, the wealth inequality in Saudi Arabia outweighs that of other countries, such as the United States and UK (Foran et al. 2014). The onus is on the central government and the local government – in conjunction with the private sector – to institute strategies to remedy the spatial inequality that has been evident in Riyadh.

Spatial equality would minimise the socio-economic gaps between communities or residents in the municipality in addition to reducing disparities in access to employment opportunities, health and education. To its credit, the Saudi government has made considerable efforts at fighting inequality through social safety nets to benefit various social groups. As part of the Saudi Vision 2030, it has outlined particular goals, targets as well as policy strategies to eradicate social vulnerability, increase female participation in the labour force as well as enhance equal access to educational and vocational opportunities (Alsayyad and Nawar 2017). Previously, the implementation of these social safety net programmes had been afflicted by wasteful distribution and the exclusion of certain groups. Examples of these programmes that have been motivated by the objectives of Saudi Vision 2030 include the Unified Citizens Account and the *Hafiz* scheme. Thus far, *Hafiz* scheme has been helpful in mitigating the spatial inequalities between regions and also within cities. It has been specifically beneficial to approximately 11 million migrants by enabling them cope with the ravages of unemployment (Alsayyad and Nawar 2017).

7.3.3. Integration of migrants

As noted by many respondents during the main study, one of the main attributes of increased population and subsequent rapid urbanisation in Riyadh has been migration – rural-urban and international migration. Many internal migrants have encountered challenges upon arrival in Riyadh the chief of which is finding employment and affordable housing. Some of them also face rejection from the host communities who perceive them as people who have come to compete with them for the scarce opportunities and resources. However, integration of urban migrants portends many benefits, such as development of an entrepreneurial culture, economic growth and economic dynamism. UNDP (2016) notes that migrants may come with brilliant ideas that the host communities may borrow to better their livelihoods. Indeed, it is noteworthy that many Riyadh residents interviewed for this study mentioned international migrants as a driver for sustainable urbanisation in the city. Many felt that these migrants would bring ideas on how to enhance sustainable urbanisation and improve the outlook of Riyadh.

7.3.4. Gender Equality

Most of the respondents interviewed identified gender inequality as a key issue that inhibits participatory governance in the urban planning process. UNDP (2012) points out that women have an integral role to play in the SU process by virtue of their innovativeness and creativity. One thing that was clear during the interviews was that women have not been afforded equal opportunities as their male counterparts to participate in the development of Riyadh. Nonetheless, to the credit of the authorities, women are increasingly obtaining more opportunities to partake in the development of the city by virtue of increasing freedoms granted unto them. As at 2012, women are now able to stand for municipal elections in addition to voting for their favourite candidates. This increasing participation of women would ensure that they are able to maximise on their potentials and skills for the betterment of the city (MOMRA 2013).

7.4. Political dimension

The political dimension of the SU framework is concerned with the political aspects of sustainable urbanisation in Riyadh. Through interviews with the respondents, the study identified the following political issues (see Figure 7-3) as being impactful on sustainable urbanisation in Riyadh.

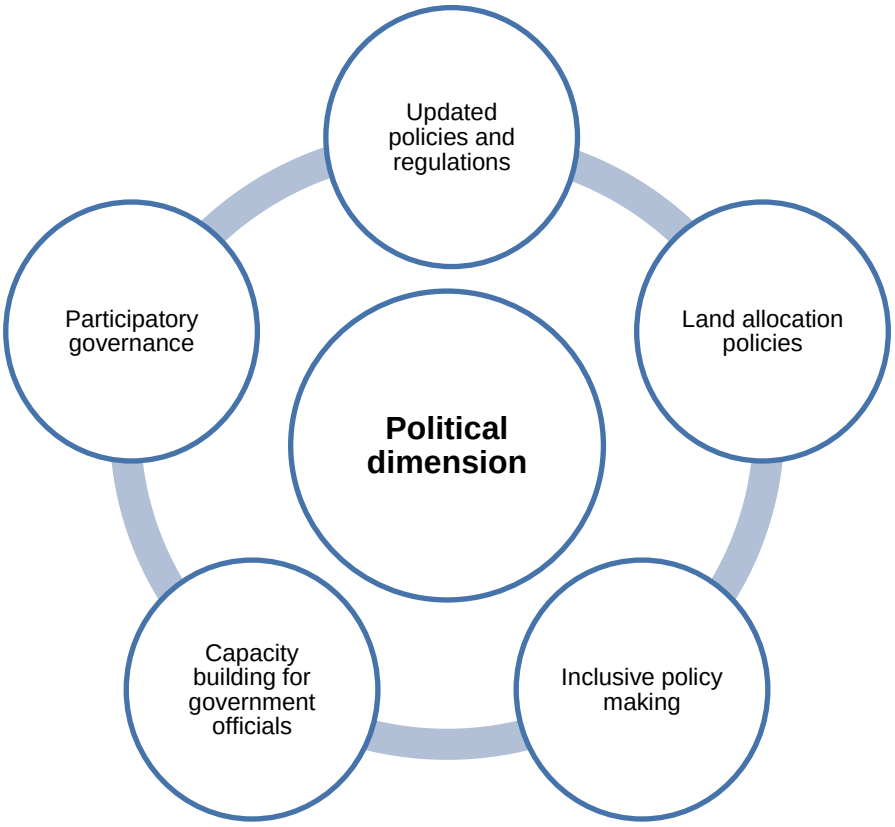


Figure 7-3: Political dimension of sustainable urbanisation as identified by respondents

7.4.1. Participatory governance

One of the recurrent issues that emerged in the interviews with the four categories of respondents was the lack of community involvement in the various urban planning processes. While government experts lamented the lack of public awareness and – subsequently – poor cooperation with the public, Riyadh residents complained that policy formulation processes are undertaken without their input. This issue brings to the fore the need for participatory governance in sustainable urban planning. UNDP (2016) describes participatory governance as one in which all stakeholders are included in the urban planning processes to ensure that their respective needs are catered for. In most cases, including in Riyadh, local economic elites and outside investors have had a disproportionately greater say in the urban planning processes. Conversely, mechanisms to encourage public involvement in these processes have been underdeveloped and underutilised (UNDP 2016). With participatory governance comes increased social cohesion among people of

varying backgrounds within the city. It also creates accountability of public officials by forestalling the collusion, capture and influence of the political system by the elites.

Furthermore, UNDP (2016) suggests that participatory governance can only materialise through an integration of the activities of the different levels of government. Noteworthy, the study identified poor coordination among urban planning officials as a key barrier to sustainable urbanisation. This is exemplified during policy, making where policies would be enacted at the higher levels of government and afterwards passed down to the municipalities for implementation (Bajaber 2017). In contrast, UNDP (2016) notes that policies, programmes and plans enacted by the government should be based on the needs or demands of the people at the grassroots. This is only possible if the different levels of governance coordinate with each other in identifying these needs and demands, which will guide in developing evidence-based policies.

7.4.2. Updated policies and regulations

One of the challenges in planning for sustainable urbanisation – as noted by most respondents – was the lack of relevant policies and regulations to guide the process. Indeed, the Future Saudi Cities Programme (2016) notes that many urban planning policies are not flexible enough to guide the changing circumstances as far as the urban population is concerned. Land use in Riyadh is one area that has been negatively affected by the lack of relevant policies and regulations. Bidgood et al. (2017) note that urban planning officials need to enact policies that enhance land use by catering to the following areas: management of government land; location and capital investment planning; and land regulation.

Lack of policies to guide the aforementioned components has increased the urban sprawl in Riyadh as the city continues to increase beyond its designated boundaries. Bidgood et al. (2017) points out that there are many hectares of vacant or underutilised land in Riyadh, which are in possession of government entities (60 percent), real estate developers, landholders with disputed or unclear ownership, land investors or speculators and recipients of land plots for housing. In the case of landholders, they simply do not have incentives to encourage them to develop their land areas, especially for those in central locations. Future Saudi Cities Programme (2016) also mentions the National Spatial Plan as an outdated plan that has prevented municipal urban planning authorities from maximising on the socio-economic potential of certain sites and delivering in investment opportunities. This technocratic spatial planning system has further prevented municipal or local planning authorities from meeting their sub-national development opportunities, needs and priorities.

7.4.3. Capacity building for government officials

Equally important to sustainable urbanisation is improved capacity building of officials concerned with urban planning, including central and local government. Future Saudi Cities Programme (2016) notes that urban planning in Riyadh and other parts of Saudi Arabia has been bedevilled by a shortage of qualified urban planning officials who are knowledgeable on the modern trends of urban planning. Furthermore, urban planning officials at the municipal level expend most of their energy in resolving local land disputes and minor operational details rather than producing more strategic plans. The task of preparing these strategic plans has been delegated to foreign consultants (Future Saudi Cities Programme 2016).

Capacity building would entail enlightening these officials on sustainable urban practices and formulation of legislation on sustainable urbanisation. This could be achieved by liaising with academic institutions to provide courses on urban planning, particularly sustainable urban planning. Both the government and the academia should endeavour to market planning as a lucrative course considering the lukewarm reception that this course has received in the past. Many academic institutions have encountered challenges in recruiting prospective students of urban planning. Future Saudi Cities Programme (2016) attributes this poor recruitment of planning students to the poor remuneration of planning officials, which has subsequently painted the profession as unattractive. Urban planning officials should be enlightened and trained on spatial analytical skills, which are integral for sustainable urban planning. Examples of such skills include the use of GIS, forecasting and statistical analysis (Future Saudi Cities Programme 2016). Training of urban planning officials on aforementioned skills should focus on analysing and interpreting the information gathered from the use of these technologies.

7.5. Economic dimension

This dimension sheds light on the economic aspects of sustainable urbanisation in Riyadh. Analysis of the respondents' comments identified various economic factors of sustainable urbanisation (Figure 7-4).

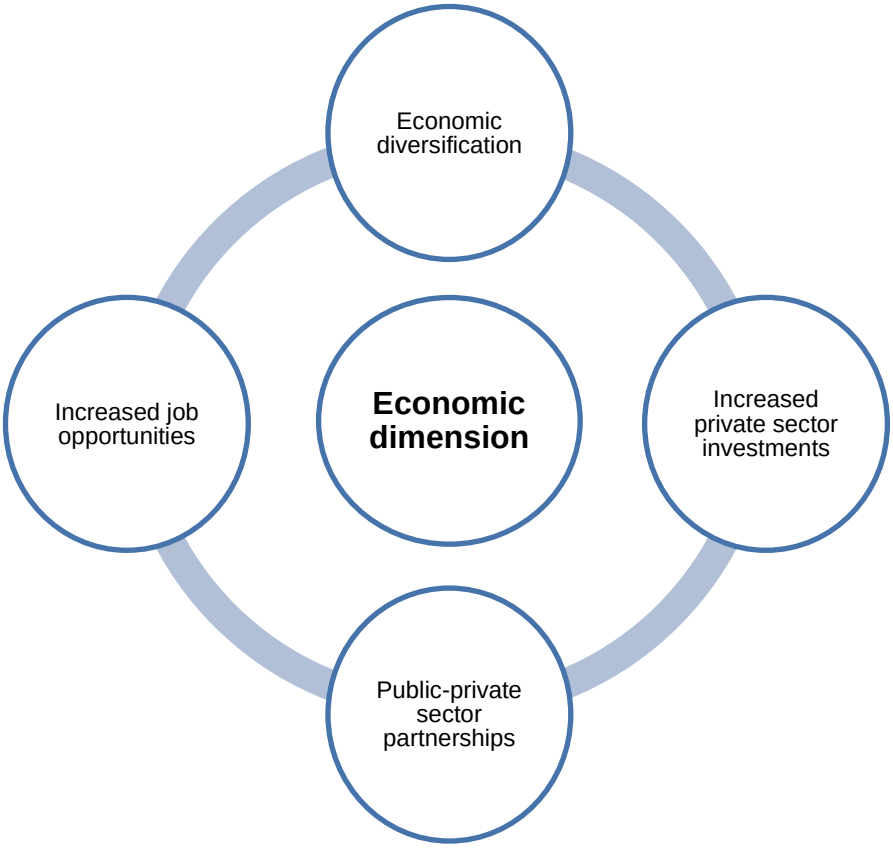


Figure 7-4: Economic dimension of sustainable urbanisation as identified by respondents

7.5.1. Increased job opportunities

The government needs to increase opportunities for millions of unemployed youth in order to avoid the repercussions of a demographic bulge that is currently occurring in Saudi Arabia. Unemployment as a ticking time bomb that might result in millions of frustrated youth turning to criminal activities or radicalisation. That Saudi Arabia is currently experiencing a demographic bulge is evidenced by the fact that almost half of its population is aged 25 years and below. Al-Kibsi et al. (2015) notes that the number of Saudis aged 15 years and above is likely to increase by approximately 6 million by 2030. Thus, the number of Saudi youth in the job market may be at least 10 million by 2030 without including the increase in female labour force participation.

The demographic bulge thus necessitates the increase in private sector investment into the economy. Most Saudis are employed in the public sector whereas foreigners occupy most of the jobs in the private sector. Nonetheless, as some of the respondents noted, the jobs in the public

sector are not enough to support or accommodate this demographic bulge. Unemployment has been further compounded by the kingdom's poor record of private sector job creation. However, limiting the influx of foreign employees is not plausible solution to creating employment opportunities for Saudi youths in light of the Saudization policy, which decrees that private companies must employ a certain number of Saudi nationals. On the other hand, increasing private sector investments in the aforementioned sectors would increase employment opportunities for Riyadh residents and Saudi youths in general. Al-Kibsi et al. (2015) project that private sector investment would create 6 million new jobs for Saudi youths by 2030. In the case of Riyadh, it is important for the private sector to be involved in sustainable urban planning processes. The private sector could come up with sustainable investment strategies in key areas, such as waste management, water resource management and infrastructural development.

7.5.2. Increased private sector investments

Increased private sector investment has been one of the core pillars of KSA's strategic plans, such as the National Transformation Plan (NTP) and Saudi Vision 2020. It is integral to the creation of more job opportunities for the millions of Saudi youth who graduate from the country's institutions of higher learning. This is crucial considering that Saudi Arabia can no longer depend on oil revenue and public spending due to the fluctuation of oil prices in the global market. This would translate into a reduction of the kingdom's gross domestic product (GDP) as was exhibited in the second half of 2014 when oil prices in the global market dropped by an approximately 50%. From a surplus of 6.5% of GDP in 2013, Saudi Arabia's budget experienced a deficit of 2.3% of the GDP in 2014 (Al-Kibsi et al. 2015). Furthermore, increased dependence on oil revenues will be counterproductive as other countries on the global discover oil within their territories whereas the world focuses its attention on renewable forms of energy.

On the basis of these challenges, Riyadh has to encourage more private sector investments. Apart from potentially doubling the GDP of the entire kingdom, private sector investment will increase employment opportunities for Saudi youths. Al-Kibsi et al. (2015) identify the following sectors as most suited for increased private sector investment: mining and metals; finance; tourism and hospitality; construction; manufacturing; health care; retail and wholesale trade; and petrochemicals. The authors project that these aforementioned sectors could contribute as much as 60% of the overall GDP by 2030. The impact of the non-oil private sector in Saudi Arabia has already been felt insofar as its contribution to the GDP growth rate is concerned. Between 2003 and 2013, the non-oil private sector grew at an annual rate of 10% compared to the overall GDP growth rate of 6% within the same period. These sectors included communications, transport, retail and wholesale trade and business services (Al-Kibsi et al. 2015).

7.5.3. Public-private sector partnerships

During the interviews, many respondents in the three categories noted the need to involve the private sector in the sustainable urbanisation process. Furthermore, strained public infrastructures were mentioned regularly as one of the consequences of rapid urbanisation in Riyadh. Many respondents mentioned the road network, recreational parks, green spaces and health facilities as some of the public infrastructures that have been impacted by the increasing population of Riyadh.

Public-private sector partnerships (PPPs) are part of a multi-stakeholder strategy of improving sustainable urban planning. Apart from the private sector, the other stakeholders in this process include NGOs/civil societies, academic institutions and members of the public. UNHABITAT (2017) notes that public-private sector partnerships can benefit various city projects through innovative approaches introduced by the private sector in addition to extra financing and talent provided by the private sector. In the case of Riyadh – as well as Saudi Arabia in general – the government would not need to borrow huge sums of money or loans to finance various projects lined up as part of the sustainable urbanisation process. The private sector would relieve the public sector of the burden of developing and maintaining infrastructure, delivery of services to the people, environmental protection and local economic development, among others.

Through public-private sector partnerships, the public sector can benefit from additional investment and innovative approaches required to maintain various projects. Not only can the private sector provide additional funding, but it can also provide innovative finance solutions to enable the public sector generate additional revenues from the various projects. Such partnerships can enhance accountability and prudent management of the project finances by virtue of the private sectors' tendency to impose due diligence requirements on the key components of a project, including revenue forecasts, contingencies, cost estimates and refurbishment, among others. UNHABITAT (2017) further notes that the private sector's tendency for on-time delivery of projects bodes well for the public sector, which is more used to the conventional project delivery. Public-private sector partnerships would ensure that the projects are delivered in accordance with the budget as per the agreed timescale and performance requirements.

Another benefit of PPPs is that they allow for better risk management. In most cases, the risks related to construction, sourcing of funds, design, operations and maintenance as well as integration of various subcontractors are assumed by the private sector partners. This is due to their skills in risk management, which reduces the chances of costly complications occurring. On the other hand, this allows the public sector partner to focus on monitoring the service delivery and defining the benchmarks that will guide the monitoring of these projects. Noteworthy, the public sector would have to cede its control of the execution of sustainable projects to the private sector.

Depending on the terms of a contract, however, the public sector may intervene and take over management of the project. UNHABITAT (2017) nonetheless, warns that PPPs should be safeguarded from political or administrative meddling because this may result in delays and cost overruns.

7.6. Environmental Dimension

The environmental dimension of SU framework focuses on the environmental issues that come to the fore insofar as sustainable urbanisation is concerned. As indicated in Figure 7-5, the respondents identified various environmental issues that were subsequently incorporated into the proposed framework.

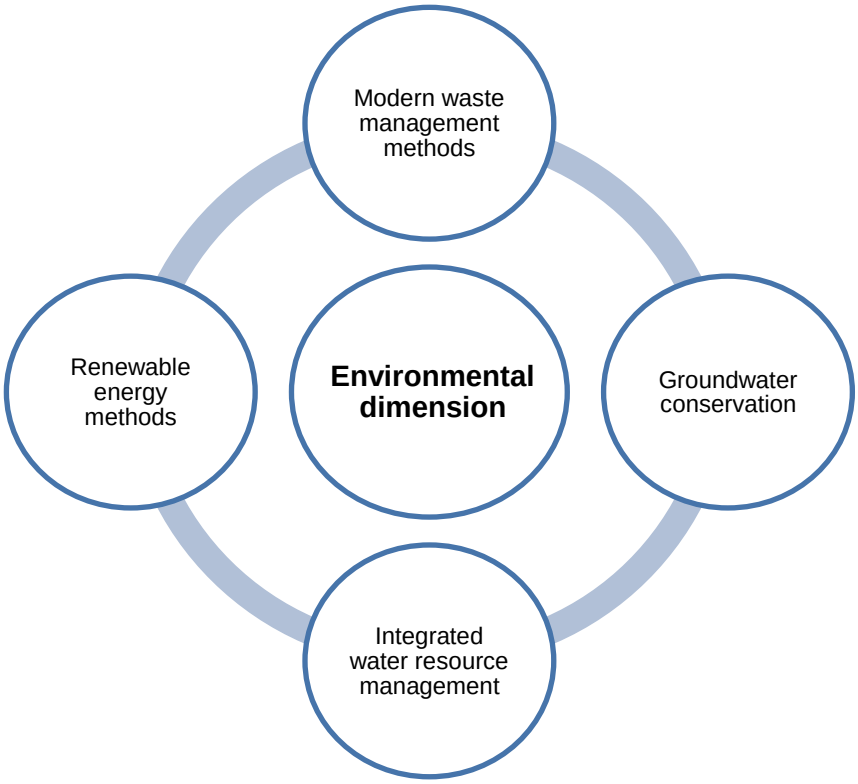


Figure 7-5: Environmental dimension of SU framework as identified by respondents

7.6.1. Integrated water resource management

One of the issues emerging from the interviews was the perennial problem of water scarcity in Riyadh. Many respondents attributed the water scarcity in the city to the increasing demand for and consumption, which has exacerbated the problem. Adoption of an integrated water resource management is key to meeting the needs of all sectors by balancing between demand and supply. It involves the prudent management of water resources, such as floodwater, non-renewable and renewable groundwater sources. Also included under integrated water resource management is the expansion of the use and quality control of treated wastewater as well as the adoption of modern agricultural or irrigation methods.

As part of an integrated water resource management, treatment of waste water can enhance water and food security. Much of this water can be used for nondrinking purposes, including horticulture, maintenance of green spaces, agriculture/irrigation and other environmental uses.

DeNicola et al. (2015) further note the importance of recycling or reusing waste water. It saves the energy and resources used in pumping freshwater and minimises the amount of treated and untreated effluent that is discharged into the environment. Considering that environmental degradation featured prominently in the interviews, recycling of wastewater would go a long way in reducing pollution occasioned by wastewater. Already, the impacts of treated wastewater have been felt in other parts of Saudi Arabia. The use of municipal wastewater to irrigate wheat and alfalfa farmlands has increased nutrients available to these crops while lowering the costs required for fertilisation and irrigation (DeNicola et al. 2015). Presently, Saudi Arabia's use of treated wastewater is low compared to the amount of wastewater collected and treated every day. Out of the 672 million cubic meters of wastewater collected, the kingdom uses only 20% as part of its water supply (DeNicola et al. 2015).

Some of the respondents also pointed out that climate change has manifested itself in the kingdom. Some noted that Riyadh receives a lot of rainfall during the April-May season during which the city experiences flash floods in certain areas. Rainwater harvesting is one of the integrated water resource management strategies for coping with increased water scarcity. This process entails collecting water from rooftops, rock surfaces and land surfaces before storing it into artificial or natural reservoirs. Rainwater harvesting is not only the preserve of the government but also of the citizens. In this case, the community is provided with resources and knowledge on harvesting rain water to mitigate their own consumption patterns. DeNicola et al. (2015) note that decentralisation of rainwater harvesting to the grassroots would increase the citizens' awareness on how their consumption habits affect water supply. This would help improve water conservation starting from the grassroots level. This suggestion is noteworthy considering that one of the reasons for increased consumption of water has been the lack of a public awareness on the need for water conservation.

7.6.2. Renewable energy methods

Many of the respondents attributed the increased environmental pollution to traffic congestion, industrial activities and poor waste disposal. The perception of such respondents was that cars and industrial activities were emitting poisonous gases into the atmosphere resulting in poor air quality. Likewise, the use of poor waste disposal methods was also perceived as detrimental to the health of Riyadh residents. Through these comments decrying environmental pollution, it was clear that there is a need to adopt renewable energy methods. The respondents portended that these renewable energy methods would be applicable across the different sectors of the Riyadh society.

One of the starting points for the adoption of renewable energy methods is the housing sector where there are various sustainable building materials in the housing sector, including the use of solar panels and water harvesters to mitigate water consumption. However, private developers require guidelines from the government as well as incentives to encourage them to invest in these renewable energy methods when constructing new houses. Adoption of renewable energy methods is impeded by the perception that they are too expensive compared to other forms of energy. Furthermore, many countries and cities perceive that they can tackle pollution efficiently after they have developed economically and thus are content to use unsustainable forms of energy in the meantime (UNDP 2016).

Some of the respondents also highlighted the importance of a mass public transport system as a means of reducing traffic congestion. ADA (2015) notes that this system would reduce greenhouse emissions caused by the presence of many private cars on the road network.

7.6.3. Modern waste management methods

The need for modern waste management methods rang out clearly amidst the respondents' complaints about poor waste disposal by the municipality. Many of the respondents attributed this challenge to the increasing population in the city, which has consequently resulted in increased municipal solid waste that the municipality has been unable to handle. That waste management is a huge problem in Riyadh has been exhibited in the case of Wadi Hanifa valley, which for many years bore the brunt of locals dumping waste in this area, which is home to various groundwater resources.

One of the cornerstones of modern waste management methods is the adoption of waste recycling. This would reduce the challenge associated with the use of landfilling, which is increased pollution of the atmosphere through emission of harmful gases, such as methane (Anjum et al. 2016). Apart from reduced harm to the environment, recycling would create job opportunities for many residents involved in recycling of waste products. UNDP (2016) identifies waste-to-energy technologies as one renewable strategy for tackling the build-up of garbage in landfills. As has been applied in other cities, Riyadh would benefit from this technology by harnessing methane gas from the landfills, which can then be used to for other purposes, such as powering of vehicles and cooking. Furthermore, harnessing of methane reduces the emission of greenhouse gases into the atmosphere while increasing forest carbon sequestration concurrently. Failure to deal with congested landfills would result in environmental and health hazards attributable to unchecked emission of methane gas into the environment. Health complications resulting from exposure to methane include suffocation, slurred speech, flushing, vomiting, nausea and headache.

Part of the modern waste management methods also has to consider how to handle the increasing proportion of electronic waste. GAMEP (2017) notes that electronic waste from electronic manufacturers and agents have contributed significantly to the increased municipal solid waste. This has been attributed to the technological revolution that has been sweeping over Riyadh – much like other places in the world – as residents' demand for technological gadgets increase. Nonetheless, these gadgets pose serious health risks resulting from emission of harmful chemicals when disposed in a haphazard manner. Community involvement will be important in the application of modern waste management methods. This is noteworthy considering the fact that the interviews with the respondents identified members of the public as the main culprits of poor waste disposal owing to a lack of awareness of better waste disposal practices, such as recycling and reuse. The benefit of an enlightened public is a reduction in the municipal solid waste.

7.7. Compiled SU Framework

Having outlined the issues identified under the respective five dimensions of sustainable urbanisation, the dimensions have been consequently compiled into a proposed SU framework as far as sustainable urbanisation in Riyadh is concerned. Table 7-1 identifies the issues identified by the respective categories of respondents as far as the five dimensions are concerned. Figure 7-6 indicates the proposed SU framework for sustainable urbanisation in Riyadh based on the issues identified during the main study. Noteworthy is that the proposed sustainable urbanisation will be subjected to testing and validation through focus group discussions (FGDs) with Riyadh residents, government/urban planning officials and academics. Consequently, it is projected that more issues will be identified under the respective dimensions of sustainable urbanisation framework.

Table 7-1: Dimensions of the proposed sustainable urbanisation framework as per the respondents

	Physical	**Social**	**Political**	**Economic**	**Environmental**
Riyadh residents	▪ Affordable housing ▪ Mass transit public transport	▪ Gender equality ▪ Public participation ▪ Access to resources ▪ Access to public spaces	▪ Improved land allocation • Inclusive policy making process	▪ Increased employment opportunities ▪ Increased private sector investment	• Groundwater conservation • Modern waste management • Renewable energy sources

Government Experts	• Increased recreational facilities, green spaces • Mass transit public transport • Increased public facilities e.g. hospitals • Preservation of historical sites	• Public awareness programmers • Integration of migrants	• Capacity building for urban planning officials • Updated urban planning laws and guidelines • More powers for municipalities	Diversification of the economy	• Natural resource protection • Integrated water resource management
Academics	▪ Recreational facilities and green spaces ▪ Sustainable public infrastructure	▪ Social equality ▪ Social benefits	▪ Capacity building ▪ Flexible policies and guidelines ▪ Inclusive policymaking process	▪ Diversification of the economy	▪ Increased water production ▪ Renewable energy sources

Official documents	▪ Sustainable building materials ▪ Recreational facilities and green spaces	▪ Spatial equality ▪ Gender equality	▪ Restructuring of governance structure ▪ Participatory governance	▪ Increase public-private sector partnership ▪ Increase private sector investment	▪ Modern waste management methods (recycling, waste-to-energy) ▪ Integrated water resource management ▪ Renewable energy methods

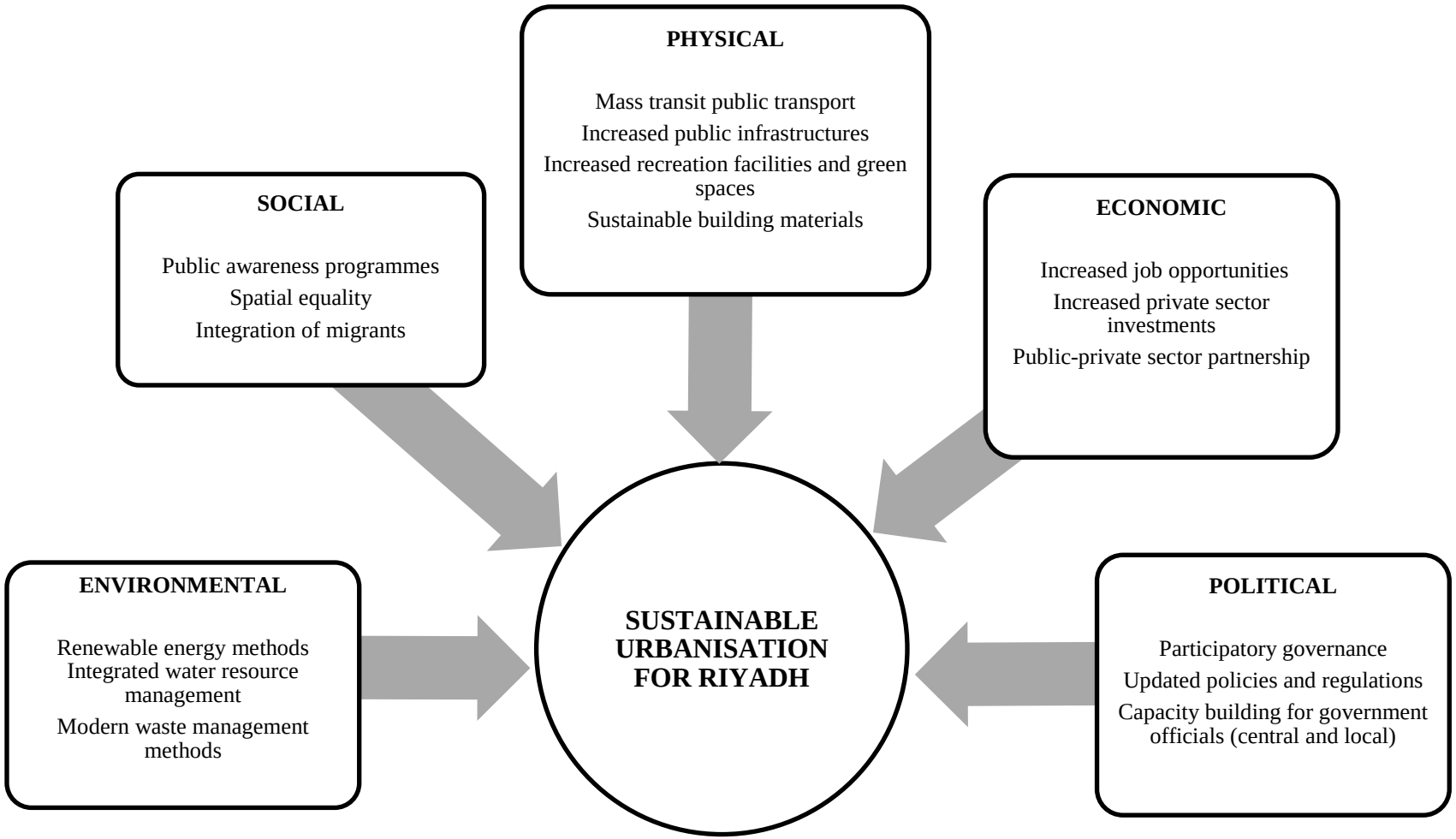


Figure 7-6: Proposed sustainable urbanisation framework for all categories of respondents

The successful implementation of this proposed SU framework depends on the involvement of various stakeholders in urban planning and implementation process. They include the following:

- *Members of the public*

Residents of Riyadh will be integral in the success of sustainable urbanisation considering that their ineffective participation in urban planning and implementation has previously precipitated various challenges. An example of a challenge has been witnessed in the implementation of the Saudi Building Code due to the lack of public involvement in the formulation of the code. Al-Surf et al. (2013) note that many people were not aware of the existence of the committee entrusted with the implementation of the SBC and this hampered the successful implementation of the code. With regards to this proposed SU framework, the public will play key roles with regards to various issues identified, such as public awareness programmes, formulation of new policies and regulations, integration of migrants, adoption of renewable energy methods and modern waste management methods.

- *Central and local government*

Both levels of government will be responsible for providing the resources required for implementing the various aspects of the proposed SU framework. The central government will be required to provide financial resources for the development of the mass transit public transport system, increase of recreational facilities and green spaces, and public awareness programmes. As the level of governance that is closest to the people, the local government will be tasked with providing a platform for participatory governance such that Riyadh residents can congregate to air their views, needs and concerns regarding various aspects of urban planning and implementation. The local government will be the link between the people and the central government during the policy formulation process by factoring in the legislative proposals of the residents before passing them to the central government for consideration when making new policies and legislation related to urbanisation.

- *Private sector*

The role of the private sector in urban planning and implementation in Riyadh and Saudi Arabia has been minimal. However, the private sector has an integral role to play in sustainable urbanisation. It brings with it an innovative approach that would be helpful in implementing certain aspects of the SU framework. Through partnerships with the government, the private sector can help provide extra funding to sustainable development projects. The private sector would also play an integral role in the adoption of modern waste management methods by providing innovative

technology to implement such methods, such as waste-to-recycling. This would relieve the government of the burden of providing sewerage services in which it has not fared well.

- *Academic institutions*

According to Future Saudi Cities Programme (2016), the academia has been historically excluded from the urban planning and development process in KSA. By virtue of the fact that they regularly undertake research on various issues, academic institutions are hubs of data on various issues related to urbanisation in Riyadh including, demography, the extent of environmental degradation and green space per capita. The data could provide other stakeholders with empirical evidence for sustainable urbanisation by identifying the opportunities for sustainable urbanisation as well as the threats. Cooperation with academic institutions will also be integral in building the capacity of government officials on the latest knowledge and skills on urban planning and development. These institutions would be expected to develop courses that cater to the needs of government officials as far as sustainable urban planning is concerned. Academic institutions would also be integral in public awareness programmes by enlightening students on the importance of sustainable practices in preserving the environment for the future generations.

7.8. Conclusion

The following are the key proposals identified as part of the SU framework:

- Integration of migrants into the social fabric holds much promise for sustainable urbanisation in Riyadh owing to the unique approaches of the migrants;
- The public sector will need the help of the private sector in alleviating most of the problems associated with rapid urbanisation of Riyadh, including poor waste management, strained public infrastructures, lack of affordable housing, unemployment and environmental pollution;
- Participatory governance is an important ingredient in developing evidence-based policies that address the needs and demands of the locals;
- There should be more collaboration between the government and the academic institutions to build capacity of urban planning officials;
- The adoption of sustainable building materials is necessary to reduce the costs associated with building residential properties. These materials are primarily integral in conserving the environment;
- Spatial equality is necessary to ensure that all residents of Riyadh gain equal access to essential services, such as education, sanitation and health; and
- There is need to increase the number of recreational facilities and green spaces in Riyadh to enhance social cohesion among residents and improve vegetation cover in the city.

CHAPTER 8: VERIFICATION OF STUDY FINDINGS AND ANALYSIS OF PROPOSED SU FRAMEWORK

8.1. Introduction

After the analysis of the data collected and compilation of study findings, the next step in the research was to verify the findings through a focus group discussion with three categories of respondents. They included six Riyadh residents, three urban planning officials and three academics all of who had participated in the main study. Each focus group discussion lasted approximately 60-90 minutes during which the participants aired their questions, concerns and suggestions on the proposed framework and the findings on the main study. The sessions were moderated by the researcher who asked the participants to introduce themselves. The researcher also reminded the participants of the objectives of the study, its rationale, methodological approach and the research findings. Also covered before the commencement of the discussions was the ground rules for the deliberations. The researcher/moderator informed participants of the need to be respectful of each other's views regardless of the divergence. Use of foul language and interruptions of other participants was not allowed. During the deliberations, each participant was afforded an opportunity to ask the researcher questions regarding various aspects as well as provide suggestions on how to improve the framework by adding or removing certain issues. Furthermore, the moderator would ask follow-up questions to gain an in-depth understanding of the views expressed by the participants.

8.2. Riyadh Residents

The testing and validation of the framework was first conducted among Riyadh residents who participated in the main study. This was conducted in the form of focus group discussions that involved six (6) Riyadh residents out of the 30 residents who were interviewed in the main study. Table 8-1 provides a profile of the six residents that participated in the focus group discussions.

Table 8-1: Profile of Riyadh residents interviewed by the researcher and who participated in focus group discussions

Resident	Place of residence/municipality	Gender	Number of years staying in Riyadh
R1	Al-Naseem	Male	12
R2	Nemar	Male	30
R3	Al-Diriyah	Female	17
R4	Al-Olayyah	Male	32
R5	Al-Ma'athar	Female	10
R6	Al-Diriyah	Male	24

This process of verifying the study findings and the proposed SU framework, known as member checking, entails taking back the data and interpretations of a study to the respondents for purposes of confirming the credibility of the information as well as the narrative account. Lincoln and Guba (1985) describe it as the most vital technique in establishing credibility in which responsibility for doing so shifts from the researcher to the participants. During the discussions, each of the participants was provided with a copy of a factsheet (See Appendix F) detailing the findings of the study. They were invited to analyse the findings to determine whether they were developed with evidence; in addition, the participants were encouraged to provide suggestions on what should be included or excluded from the proposed sustainable urbanisation framework developed on the basis of their responses in the main study (Figure 8-1). The proceeding sections provide a narrative account of the focus group discussions session with the residents as part of the verification of the framework.

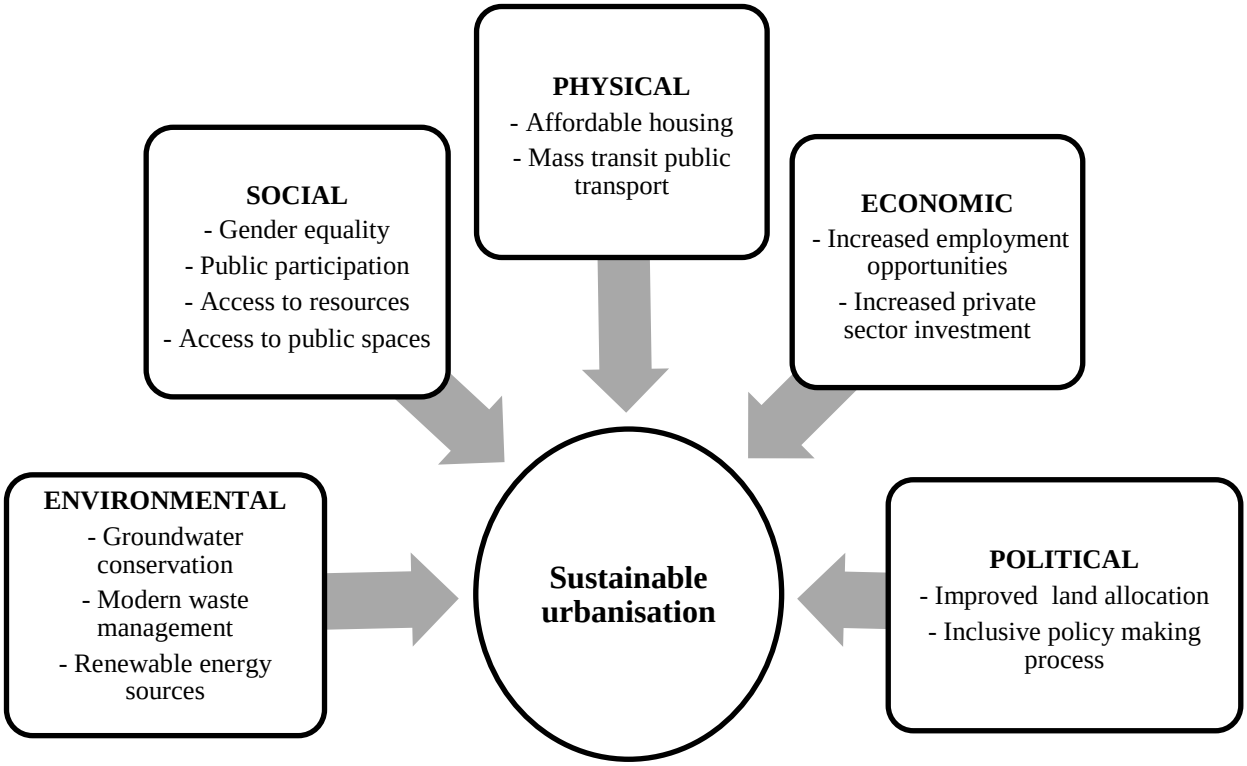


Figure 8-1: Proposed sustainable urbanisation framework based on comments from Riyadh residents

8.2.1. Economic dimension

One of the pertinent issues that were constantly mentioned by the participants was the need for increased funding for the youth to enable them form more small medium enterprises (SMEs) as well as start-ups. One of the participants (R2) pointed out that lack of proper funding for SMEs could be a barrier to sustainable urbanisation as it would prevent the youth from participating proactively in the adoption of sustainable urban practices in the city. Another participant (R1) noted that the youth have varying skills acquired from higher institutions of learning, which they can use to employ themselves by establishing SMEs and start-ups. Two of the participants (R1 and R6) agreed that there is a link between better funding for SMEs and reduction of the unemployment rates. One of them further stated that the increase in the number of SMEs would mean increased employment opportunities for the youth in Riyadh.

Another issue that came up during the focus group discussions was the high cost of living in the city. One of the participants (R2) decried the fact that his salary is not enough to cater for all of his needs because of the prices of various commodities. Another participant (R5) echoed this sentiment by providing an example of his life: he stated that he earns 4,000 Saudi Riyals which is inadequate to get her through the month considering that she spends an average of 300 Saudi Riyals per day on purchasing food and other miscellaneous issues that may occur. To this end, the

participants were unanimous in proposing a reduction of the high cost of living as a part of the economic dimension of the sustainable urbanisation framework.

Contributing to the discussion on the findings, one of the participants (R2) noted that the study had not considered road accidents as a key consequence of rapid urbanisation in Riyadh. He pointed out that – having lived in the city for his whole life – car accidents have become common in the present times compared to the past. In support, another participant (R6) attributed the increased road accidents to the fact that many people now own cars because of the relative affordability of fuel and maintenance costs. He noted that the government should consider limiting the number of cars allowed on the roads to reduce the traffic congestion, which in his opinion, is responsible for the increase in traffic accidents. Another participant (R5) supported the idea of the government building more road networks to support the increased number of cars. Adding on to the sentiments of the previous participant (R6), the participant (R5) noted that the government has the responsibility of building more roads rather than prevent people from owning cars, which is their right. Another participant (R4) said that people who cause accidents should be punished harshly and even banned from driving if that is what it takes to prevent road accidents. He also noted that the population of Riyadh will continue increasing hence the need for more road networks to accommodate the increasing population.

8.2.2. Social dimension

Some of the participants were of the view that the notion of gender equality has been misinterpreted in the Saudi society by judging it according to Western standards. In particular, one participant (R5) noted that the western notion of gender equality cannot be applied in the Saudi context in its entirety because that would entail contradicting some of the cultural values of the society. Furthermore, participants pointed out that the government has made strides towards the improvement of gender equality in the Saudi society based on the education levels of females. One of the participants (R3) further cited the recent decree that allows Saudi women to drive cars as evidence that the Saudi society has made huge strides towards improving gender parity. Another participant (R2) pointed out the fact that – unlike in the past – women are now allowed to participate in politics by voting for their leaders, including in the municipal elections. He further noted that gender equality is not an issue that is exclusive to Saudi Arabia but affects even some of the developed nations in the Western world. One other participant was of a different view that sustainable urbanisation efforts must include all stakeholders who will all be expected to adopt sustainable practices.

8.2.3. Political Dimension

Most of the participants were in agreement that poor land allocation strategies have led to scarcity of land on which residents can develop their own residential properties. One of the participants (R3) pointed an accusing finger at speculators who she noted that hold on to undeveloped land with the hope of selling them when the value increases. Another one of the participants (R1) warned that failure to change the land allocation strategies may hamper sustainable urban planning efforts because developers would be induced into haphazard urban planning practices. Furthermore, the participant (R1) proposed the need for the government to redistribute the land that it has under control in order to reduce the urban sprawl associated with the lack of affordable housing. His perception was that more land would allow private developers build more residential houses to increase the supply of housing and satisfy demand for the same.

Another issue that came out was the need to give municipal authorities more powers. One of the participants (R6) noted that municipal urban planners simply seem to implement laws without even understanding how these urban planning laws affect the residents. In support, another participant (R3) suggested that granting more powers to municipal urban planning officials would improve service delivery as well as allow residents to hold them accountable.

8.2.4. Environmental Dimension

Most of the participants noted the need for the government to consider climate change when planning for sustainable urbanisation. One of the participants (R5) noted that the study should have identified the harsh climatic conditions of Saudi Arabia as one of the challenges that will the municipality will face in actualising sustainable urban planning practices. Another participant (R4) pointed out that it would be imprudent for the government to talk about sustainable urban planning without putting measures in place to mitigate the effects of climate change. This sentiment was seconded by another participant (R2) who reiterated the need for the government to protect the natural resources of the city as part of sustainable urbanisation. The participant pointed fingers at the private developers and increasing population growth as factors that have occasioned increased depletion of the forest cover. Also deliberated upon was the nature of the industrial activities in the city, which increase air pollution. One such participant (R2) suggested that the study should propose measures for curbing the emission of harmful gases by industries, such as cement factories in the southern part of the city.

8.2.5. Physical Dimension

Some of the participants raised concerns about the mass transit public transport system. One such participant (R6) noted that it would be difficult for men and women to board the same buses as this would be in contravention of the Islamic values. In response, another participant (R2)

expressed pessimism over whether the introduction of a public transport system would really reduce congestion on the roads. He was supported in this view by another participant (R3) who pointed out that many people who own cars do not do so because of lack of other modes of transportation, such as buses. In her opinion, they do so out of luxury and the need to comfortably move from place to place.

Thus, the participants proposed that the government should instead expand the road transport network to accommodate the increasing number of people who own cars. One participant (R1) – in particular – pointed out that building more roads would help reduce traffic congestion unlike the introduction of public transport that would not necessarily discourage people from purchasing private cars.

Also discussed during the FGD was the need to inculcate Islamic designs in the sustainable housing sector. One of the participants (R3) noted that privacy is a very important factor to consider when building a house in Saudi Arabia considering the conservative nature of the Islamic family setting. One other participant (R2) decried the fact that many private developers in Riyadh and other parts of Saudi Arabia do not consider the Islamic culture when building modern houses because they are more concerned about the costs than other factors. The participant further emphasised that Islamic designs should be considered even if the buildings constructed are made of sustainable building materials. Contributing to the discussions, another participant (R5) suggested that the privacy should not only be within the family setting but also within households. The participant noted that houses do not have to be so adjacent to each other such that privacy is compromised as is the case with certain buildings.

Following the suggestions presented by the Riyadh residents, the proposed framework that had been originally developed based on the findings of the main study was revised. Figure 8-2 indicates the revised framework consisting of the proposals provided by the participants.

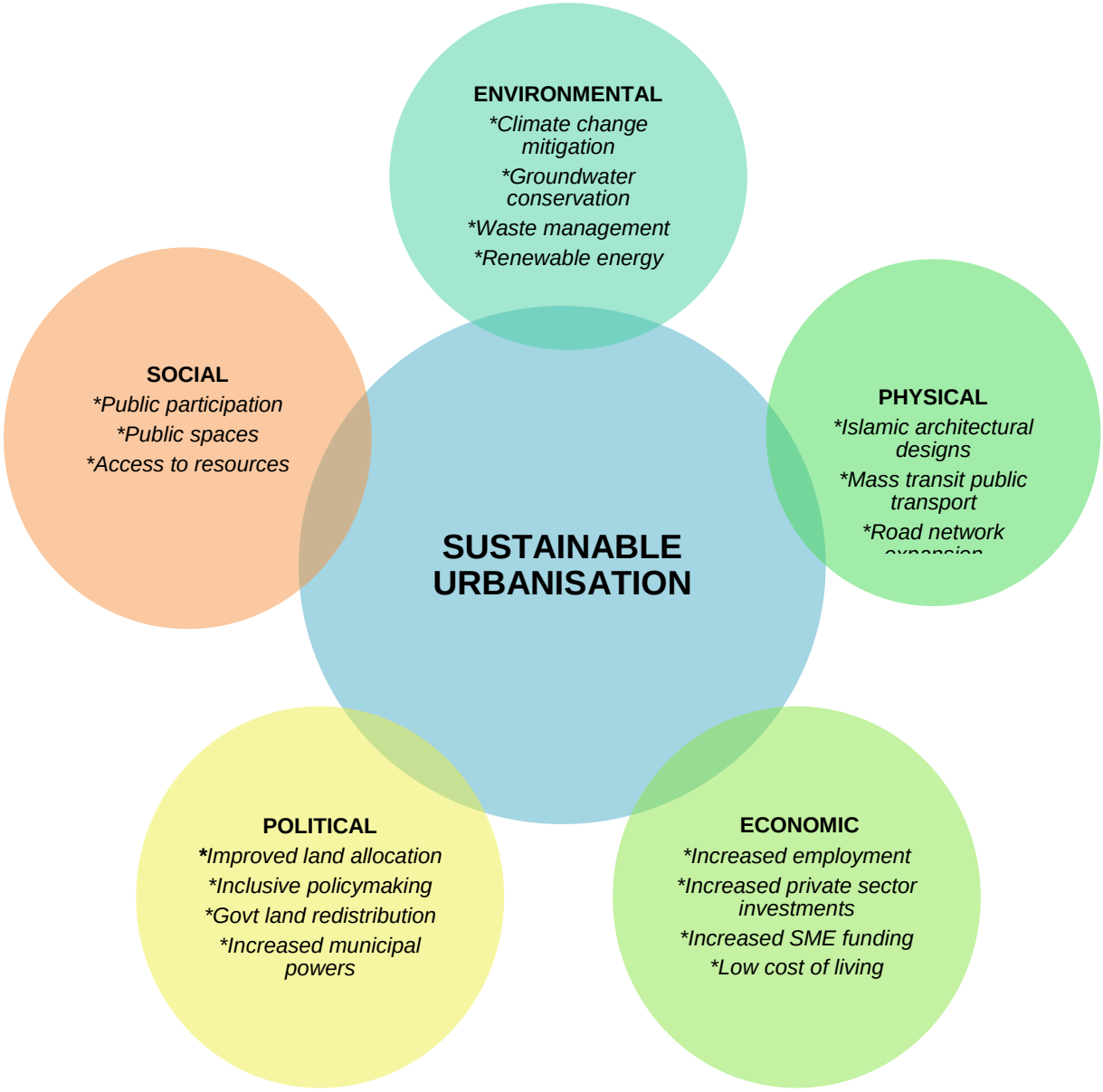


Figure 8-2: Revised SU framework based on focus group discussions with Riyadh residents

8.3. Government Experts

The second Focus Group Discussions was held with three (3) government experts working on urban planning issues at the local or central government level. Likewise, the member checking technique was applied by providing each participant with a copy of a factsheet detailing the preliminary findings of the study. Table 8-2 provides a profile of the officials who participated in the focus group discussions to verify the findings and analyse the framework. Once again, the researcher doubled up as the moderator of the deliberations to ensure adherence to the ground rules.

Table 8-2: Profile of urban planning officials/government experts who were interviewed by the researcher and participated in the focus group discussions

Expert/Official	Government institution	Specialisation	Length of experience (Years)
E1	Ministry of Municipal and Rural Affairs (MOMRA)	Urban planning	13
E2	Arriyadh Development Agency (ADA)	Architecture	10
E3	Regional government	Urban planning	7

During the verification process, the experts were asked to provide their feedback to the findings of the study and the proposed SU framework (Figure 8-3) that had been developed based on the interviews conducted with the government experts during the main study. The feedback was aimed at determining the credibility of the findings.

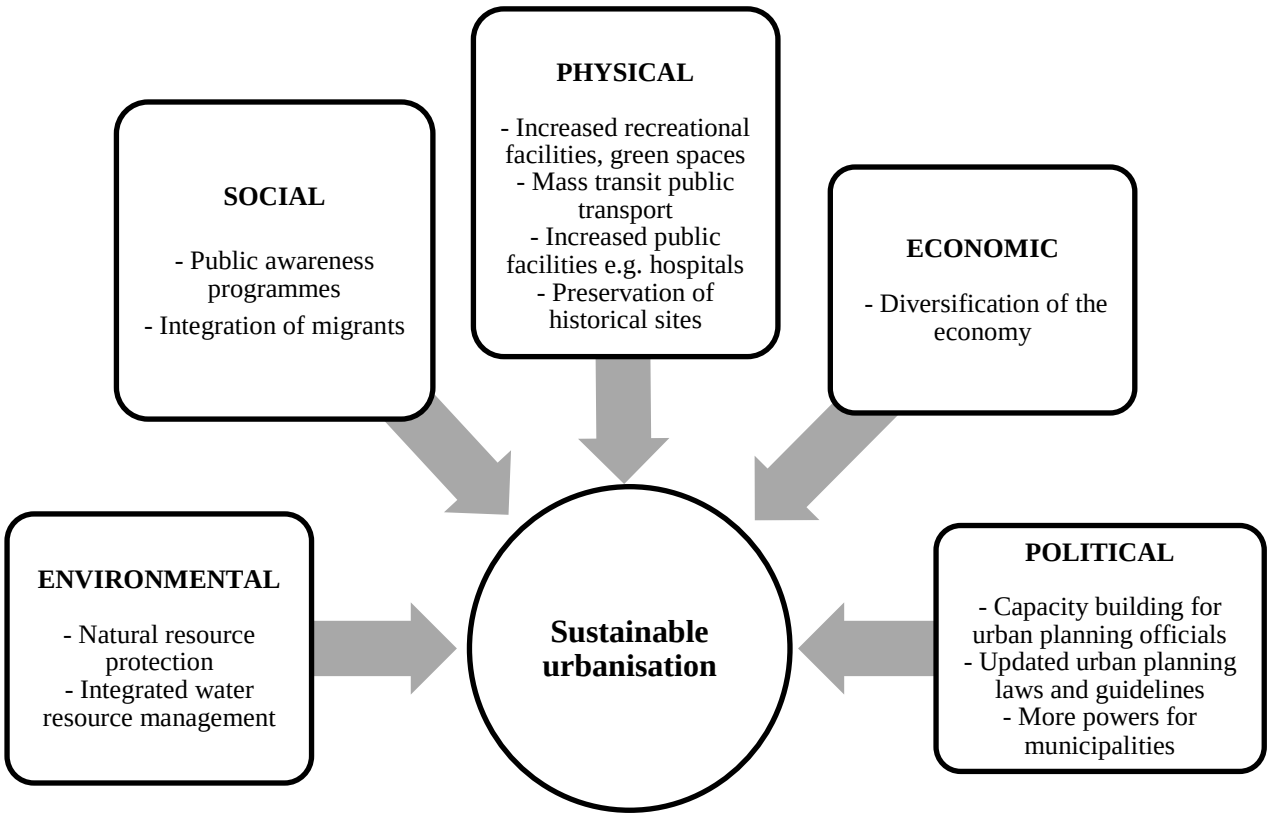


Figure 8-3: Proposed sustainable urbanisation framework based on interviews with government experts

8.3.1. Economic Dimension

Participants noted that even as the government seeks to diversify the economy into non-oil sectors, it should collaborate with the private sector in these efforts. One such participant (E2) pointed out that the study should propose the introduction of several incentives to encourage the private sector to participate in the adoption of sustainable urban practices. One of the experts (E3) suggested that the government could provide subsidies or tax reliefs for developers who use smart technologies in constructing their commercial or residential properties. Another participant (E1) agreed and noted that the adoption of renewable energy practices – for example – could be slow because some people are apprehensive over the affordability of these smart technologies, such as solar panels.

One of the experts (E1) further suggested that these tax reliefs should not only apply to private investors but also the residents. In proposing tax reliefs as part of the economic dimension of the

sustainable urbanisation framework, he proposed that the government should provide tax reliefs to residents who fit their homes with renewable energy materials, such as solar panels. Another expert (E3) agreed with this suggestion noting that Saudi Arabia could follow in the footsteps of Western countries, such as the United States and the European Union (EU), which have improved the uptake of renewable energy technologies through tax reliefs.

8.3.2. Social dimension

One of the participants (E3) noted that the government has made huge strides geared towards increasing the access to social benefits for residents, including expatriates. He mentioned the Unified Citizen's Account as an example of a social safety net programme that has thus far benefitted millions of people since its inception in February 2017. Another participant (E2) agreed with this observation noting that the presence of social safety nets is in fact a driver of sustainable urbanisation as it will improve the quality of life for the beneficiaries.

One of the experts (E1) noted the need for the study to shed light on investments in human capital. Another participant agreed and noted that increased focus on investment in human capital would help solve the unemployment problem by improving the skillset of the youth and equip them for creating their own jobs.

8.3.3. Political Dimension

One of the challenges identified by the participants insofar as urban planning is concerned is poor coordination between the ministries and agencies concerned with urban planning. One participant (E1) noted that stakeholders must revamp the urban planning structure to improve coordination between the central and local government. Another participant (E3) noted that putting in place flexible policies and legislations may not be sufficient enough to improve urban planning unless the various ministries and agencies work together and not at cross purposes. In support of this sentiment, one of the experts (E2) emphasised on the need for devolution of power to the urban planning officials at the local level. He added that the hands of these officials are tied and thus cannot come up with innovative approaches or decisions to manage the rapid urbanisation and subsequent urban sprawl in the city.

Apart from capacity building, one of the government experts (E2) noted that the government may have to employ more municipality officials in the urban planning department to improve the delivery of crucial services. The expert suggested that the study should highlight the need for public awareness programmes to encourage more youths to enrol for urban planning courses. In support, one of the participants (E1) noted that the number of people undertaking urban planning courses is minimal compared to those who are undertaking the lucrative ones, such as medicine, architecture or engineering. In response, another expert (E3) noted that youths do not need to enrol

for urban planning courses but that they should be encouraged to use the skills and knowledge acquired in their respective courses to help improve the landscape of the city. Contributing further, one government expert (E2) suggested that the study should also highlight the need for the government to improve the perks offered to municipality officials, including urban planners. He noted that these improved perks would encourage more youths to seek employment as urban planners, which would be a good thing for Riyadh considering that the youth have fresh ideas on urbanisation.

8.3.4. Environmental Dimension

The participants noted that the study findings should have shed light on the use of sustainable materials in the construction sector. One of the participants (E2) lamented over the lack of environmentally-friendly building materials in the construction sector, which has exacerbated the pollution problem in the municipality. Another participant (E1) agreed with this sentiment and cited the case of cement factories as an example of building materials that cause pollution. The participants were unanimous that the government should advocate for adoption of the concepts of green buildings, which would go a long way in reducing costs of electricity and water, among others. In support, one participant (E3) noted that most of the current buildings do not have renewable energy technologies that can help reduce pollution, water and electricity costs.

Another issue that cropped up was the use of desalination plants to solve the problem of water scarcity. One participant (E1) expressed concerns over the environmental safety of using desalination plants considering that such plants may lead to discharge of more chemicals into the water. Another participant (E3) suggested the use of public awareness programmes to enlighten the public on better ways of conserving water. The expert further suggested that the country needs to reduce the amount of water used in irrigating agricultural lands.

8.3.5. Physical Dimension

Even as the study proposes for sustainable public infrastructure, the participants agreed that the government needs to outline the materials or technologies that constitute such infrastructures. One of the participants (E3) noted that the study should identify the sustainable technologies to be included in the construction of new infrastructure as this would guide developers on how to erect new properties whether commercial or residential.

Another participant (E2) pointed out that the use of sustainable building materials should not be confined to the building of houses but government buildings as well. In agreement, another participant (E1) noted that by doing so, the government would be setting a good example to the private sector as well as the local citizens on the importance of adopting sustainable building technologies in its projects. Apart from investing in sustainable public infrastructure, the experts

also suggested that the study should highlight the need for more infrastructure to cope with the rapid urbanisation. One of the experts (E3) pointed out that the rapid population in Riyadh has created a strain on the public infrastructure, which necessitates more investment in infrastructures, such as schools and health facilities. Another expert (E1) noted that the government may not be able to finance the construction of these infrastructures by itself thus it needs to partner with the private sector.

Even as the discussions centred on the need to apply sustainable building materials to government buildings, one of the participants (E3) noted that the study should have shed more light on government regulations on public maintenance contracts. He revealed that government regulations require that the value of a new contract should be lower than that of the previous contract. Another participant (E2) agreed that this regulation gives maintenance contractors the leeway to perform shoddy jobs that are not up to standard. The participant argued that buildings will always require more repairs as they age. According to another participant (E1), the government would have to fork out more money if it is to include sustainable building materials into its buildings.

The suggestions provided by the urban planning officials/experts were included in a revised SU framework (Figure 8-4).

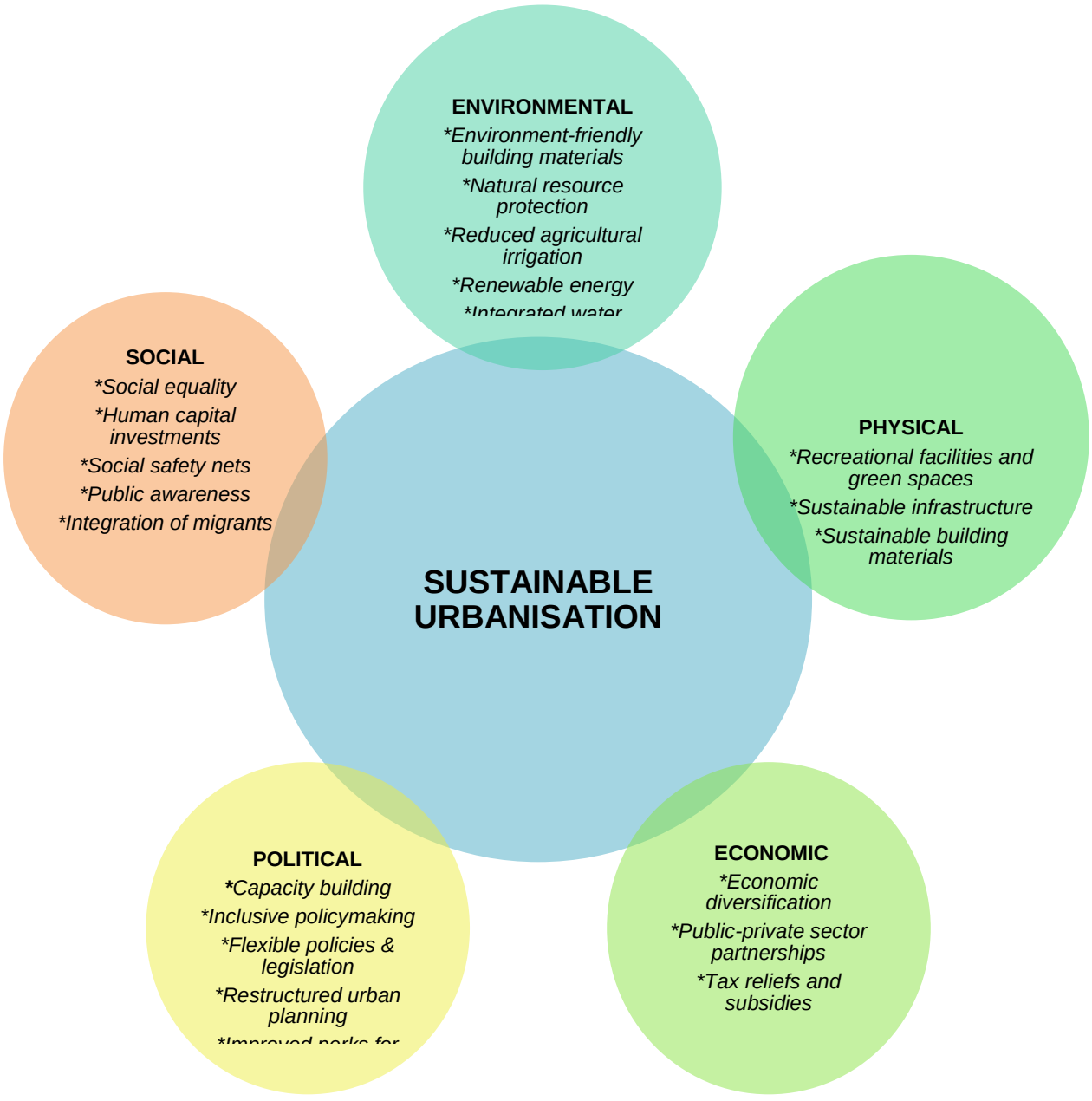


Figure 8-4: Revised SU framework based on focus group discussions with urban planning officials/experts

8.4. Academics

The third Focus Group Discussions was conducted with 3 academics who are people who have previously undertaken studies on sustainable urbanisation in Riyadh or KSA as a whole. Similarly, testing and validation of the framework assumed the form of member checking where the academics provided feedback to the findings of the study as well as the proposed SU framework (Figure 8-5) that was developed in line with the findings of the interviews conducted with academics in the main study. Table 8-3 provides a profile of the academics who participated in the focus group discussions.

Table 8-3: Profile of academics who were interviewed by the researcher and participated in testing and validation of proposed SU framework

Academics	Profession	Area of specialisation	Length of working experience (Years)
A1	Lecturer/Researcher	Population and Demography	16
A2	Lecturer/Researcher	Urban planning	21
A3	Lecturer/Researcher	Architecture	13

Each of the academics were beforehand provided with a factsheet outlining the main findings of the study, objectives, research questions and the methodology applied in the study.

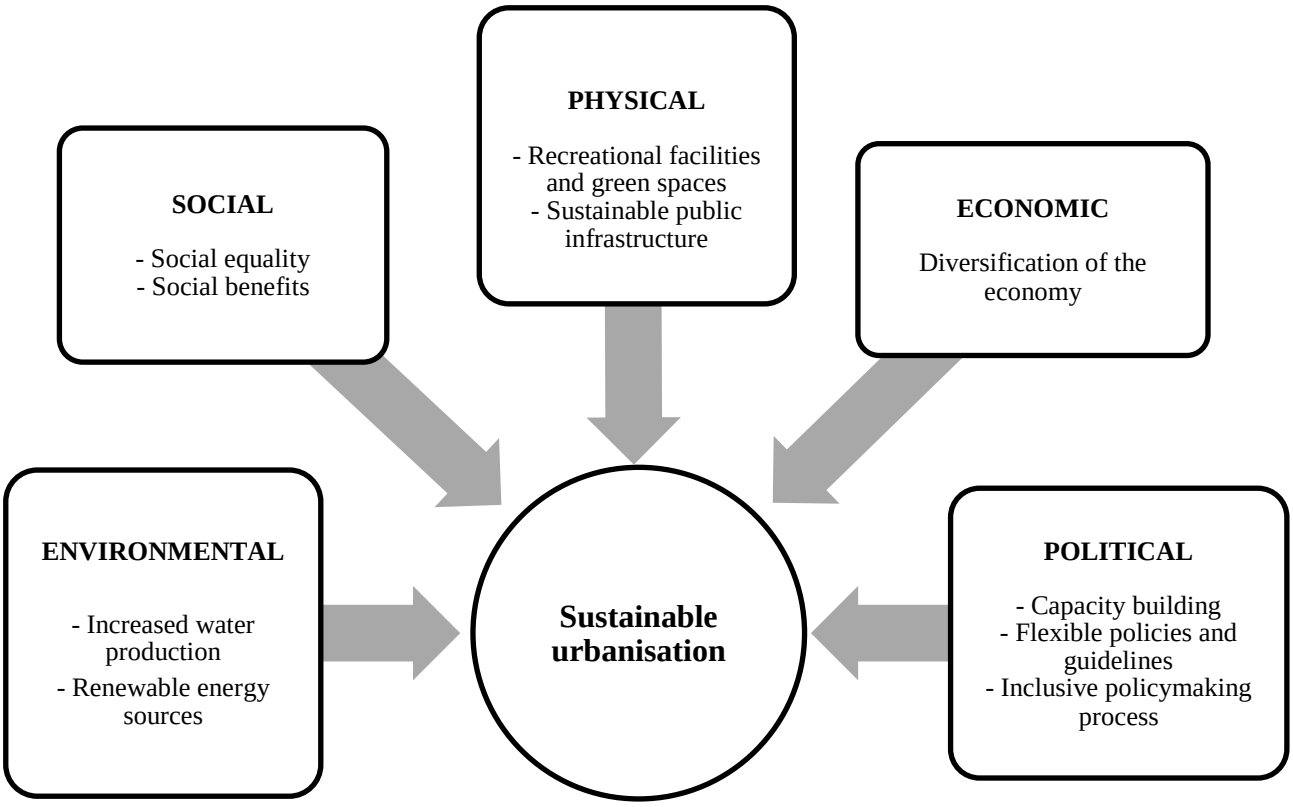


Figure 8-5: Proposed sustainable urbanisation framework based on interviews with academics

8.4.1. Economic dimension

The academics were of the opinion that increased public-private sector partnership and increased private sector investment are somewhat linked and similar. One of the participants (A1) in the FGD pointed out that increased private sector investment is dependent on public-private sector partnership. Thus, the academics advised that increased private sector investment should be excluded because it is already covered under increased public-private sector partnership.

One of the academics (A1) also noted the excellent telecommunication network in Riyadh and pointed out that it could help create more employment opportunities for the youth. Another academic (A2) suggested that the study should make note of the Internet as a platform that could be used to encourage the youth to carve out their employment opportunities.

8.4.2. Social dimension

The participants advised that the study should include public awareness programmes as part of the social dimension of the sustainable urbanisation framework. In particular, one of the participants (A2) elaborated that the awareness programs should be inculcated in school curricular to increase

awareness of sustainability practices in a majority of the residents beginning with the school children. Another participant (A1) concurred with this opinion noting that the awareness programmes should not be confined to a certain age level. He further pointed out that unsustainable practices, such as poor waste disposal do not begin at an adult phase but at a young age. Contributing to the deliberations, another participant pointed out that enlightening school children on sustainable urbanisation would ensure that the adoption of such practices can be maintained for many years to come even after the present generation is gone.

The issue of equitable development also featured prominently during the deliberations of the study findings by the academics. One of the academics (A1) identified inequitable development as one of the challenges that Riyadh urban planners will face in planning for sustainable urbanisation. He added that many rural migrants will continually migrate to the big cities, such as Riyadh so long as employment opportunities in their home areas continue to be scarce. Another academic (A2) supported this observation by noting that most migrants move to Riyadh from their rural areas because they do not find many opportunities back at home to better their lives. Contributing further, the first academic (A1) proposed that the report should point out the need for the government to improve the economic conditions at the origins of these rural migrants. In support of this suggestion, another academic (A3) observed that the availability of more employment opportunities at the areas of origin would reduce the push factors associated with rural-urban migration in Saudi Arabia, particularly in Riyadh. He further noted that these opportunities would also encourage return migration of those who are already living in the city, which would reduce the pressure associated with increased population growth. Academic A1 further reiterated the need for the national government to distribute development to the rural areas and not just in the city because this would take care of the many youths in those areas that are educated but lack employment opportunities.

The growth of digital technologies in Saudi Arabia was also extensively discussed. One of the academics (A3) noted that Internet penetration is one of the main social factors that will influence sustainable urbanisation in Riyadh. He argued that most of the youth in Saudi Arabia spend a lot of time on the Internet and subsequent social media sites, such as Twitter. In support of this observation, another academic (A1) proposed the use of the Internet as a platform for reaching out and enlightening the youth about sustainable urbanisation. He noted that the government would be able to sustain the attention of the youth and engage them in sustainable urbanisation only if it uses communication platforms with which the youth can resonate, which is the Internet. Another academic (A2) added that the government would not have to spend a lot of resources on public awareness programmes targeting the youth because Internet coverage in Riyadh is already high.

8.4.3. Political dimension

One academic (A2) decried the fact that the academia has been neglected in the sustainable urban planning process. Another participant (A3) agreed with this sentiment noting that the academia has much to contribute to the discussion on urban planning by providing empirical evidence to guide the process. They thus suggested that the sustainable urbanisation framework should include cross-collaboration between government and academia as part of the political dimension. Another participant (A1) pointed out that collaboration between the government and academia could benefit the former through training for government officials on the current and sustainable methods of urban planning. He further pointed to their extensive studies on sustainable urbanisation as experience that the government could harness to develop a curriculum for increasing public awareness on sustainable urbanisation. Contributing to the discussion regarding the political dimension, one of the participants (A3) supported an inclusive policy making process as one of the political dimensions of the sustainable urbanisation framework. He noted the process has not been inclusive in the past; rather it has been conducted by the national government and then passed down for implementation by the local government. He further reiterated that the academic institutions and experts must be included in the policy formulation process.

Another issue that was highlighted during the discussion was the need for more empirical research on sustainable urbanisation practices. One of the participants (A3) asked that the study should identify knowledge gaps that future research should investigate with regards to sustainable urbanisation. In support, another participant (A2) recommended that the report should highlight the need for improved information sharing between the government and the academia. He based his proposal on the fact that the government does not easily share information with other stakeholders on critical aspects of urban planning in Riyadh, including the demographic composition of the city, socio-economic status of city residents and statistics on access to public amenities. Another participant (A1) noted that the academia can help make sense of this information and come up with interpretations of the data. This could guide the government on the way forward regarding the policy measures and subsequent implementation.

8.4.4. Environmental dimension

Contributing to the analysis of the environmental dimension of sustainable urbanisation, one of the academics (A1) noted the importance of the study elaborating on the renewable energy methods. He further emphasised on the need to exhibit a clear link between the use of these renewable energy methods and sustainability. Another academic (A2) suggested that the study should also propose wind energy as one of the renewable energy method that can be used to reduce dependence on fossil fuels. He added that the geographical location of Riyadh – and KSA as a

whole – is advantageous in that it experiences a lot of windy days that can be harnessed to provide energy in response to the increasing demands.

Another academic (A3) suggested that the study should recommend the construction of more sewerage plants. This suggestion, he added, is informed by the fact that one of the key challenges that have affected Riyadh is a lack of a proper sewerage system. Another participant (A1) agreed with this suggestion noting that the lack of adequate sewerage plants has been responsible for increased pollution, especially the groundwater resources or water aquifers, which are a major source of water in the city.

Another participant (A3) mentioned that the study should have highlighted natural resource depletion as one of the challenges that will affect sustainable urbanisation planning. He cited the example of water aquifers noting that Saudis are currently consuming water at a high rate, which may worsen the water scarcity in the future. In response, another participant (A2) argued that the government needs to do away with subsidies given to locals as part of energy consumption. He thus suggested that the removal of these energy subsidies should constitute part of the recommendations of the study. In agreement, one other participant (A1) noted that these subsidies will be unsustainable in the long run because they will encourage overconsumption of the natural resources, such as water aquifers.

8.4.5. Physical dimension

While contributing to the deliberations, one of the academics noted that lack of proper government supervision is a barrier to sustainable urbanisation. Another participant similarly noted that the encouraging the construction sector to adopt sustainable building materials may not be enough to accelerate sustainable urban planning because some of the developers in the construction sector may not follow the set regulations. The academics advised that the framework should include government supervision of newly constructed buildings as part of the physical dimension.

Another issue that emerged during the discussion on the physical dimension of the sustainable urbanisation framework was the need for the city to adopt green buildings. One of the participants (A2) noted that the adoption of green buildings in Riyadh – and indeed in the whole of Saudi Arabia – has been poor because of the high initial costs associated with installing the requisite green building materials. One other participant (A3) suggested that the study should recommend tax cuts or subsidies to encourage private developers to enhance the diffusion and adoption of green buildings. In agreement, one of the participants (A1) noted that these materials are mainly imported, which may discourage many developers from investing in green buildings because of the high costs associated with their importation.

Figure 8-6 represents the revised SU framework for the academics based on the sentiments expressed by the academics during the testing and validation.

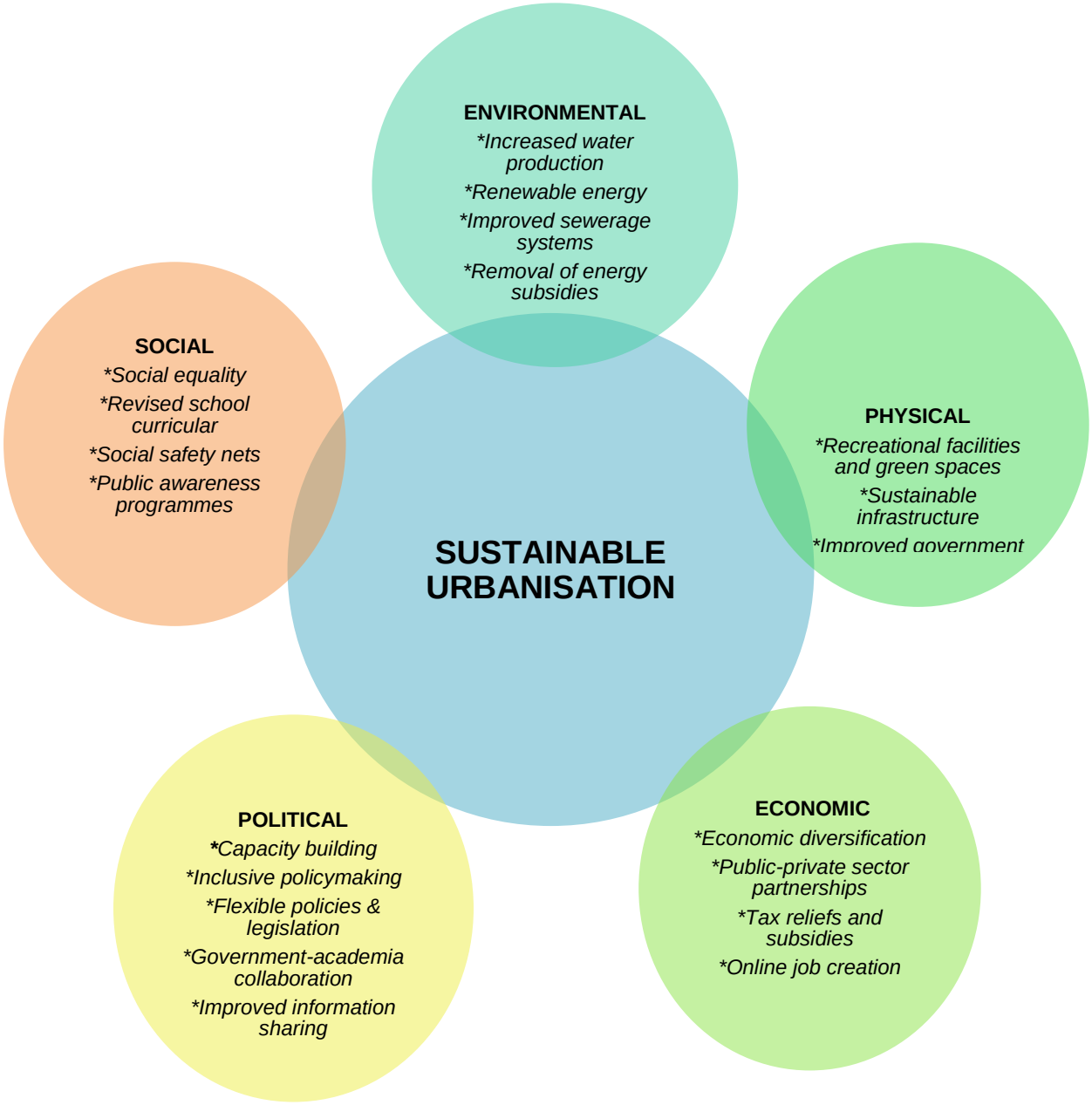


Figure 8-6: Revised sustainable urbanisation framework based on testing and validation by academics

8.5. Conclusion

The discussions with three categories of respondents brought to the fore key issues that should be included in the revised sustainable urbanisation framework. Noteworthy was the important role that the Internet can play in creating increased employment opportunities for the youth in addition to creating awareness on sustainable development – particularly among the youth who spend a lot of time online. The bureaucratic structure was further identified as an impediment to the ability of municipal officials to develop innovative approaches in handling urbanisation-related issues. Thus, the need for a restructuring of the urban planning process was suggested as a means of providing more powers to municipal officials in handling urbanisation-related issues. Equally noteworthy is the involvement of academic/research institutions in the urban planning and development process. Despite providing empirical evidence through research on various urbanisation-related issues, these institutions have largely been excluded from deliberations on how to handle the urban sprawl. Success of sustainable urban planning depends on close collaboration between the government and the academic institutions where both parties share ideas and information with one another.

CHAPTER 9: FINAL FRAMEWORK DEVELOPMENT

9.1. Introduction

The This chapter compiles the proposed strategies and solutions – identified during the focus group discussions with the three categories of respondents – into a final framework for SU in Riyadh and other desert cities. The focus group discussions focused on the initial framework for SU that had been developed based on the findings of the main study interviews with Riyadh residents, academics/researchers as well as urban planning officials. Participants in the focus group discussions analysed the components of this initial SU framework and provided their insights on what components to be added onto it as well as those that were unnecessary. Also incorporated into this compiled framework (see figure 9-1) are the strategies and solutions identified during the examination and analysis of official documents (as was undertaken in chapter 6 of the same research). These official documents included government reports and policy documents by international agencies, such as UNDP, UNEP and UNHABITAT. The government reports were obtained from agencies such as ADA, General Authority on Statistics and MOMRA.

9.2. Review of sustainable urbanisation (SU) framework

One of the objectives of this research was to develop and propose a SU framework that can be integrated into the future development of Riyadh and other urban areas within KSA. Its development was informed or guided by the sustainable urbanisation-related issues that were identified by the respondents during the exploratory and the main research interviews. These issues were related to the research questions/themes that focused on the following:

- Barriers and drivers of sustainable urbanisation;
- Impact of sustainable urbanisation on the improved quality of life;
- Historical, environmental and social factors affecting sustainable urbanisation;
- Impact of rapid urbanisation on desert and arid lands;
- Challenges in planning for sustainable urbanisation; and
- Integration of sustainable urbanisation into future development.

Based On the basis of the issues highlighted by respondents, the proposed SU framework consisted of solutions or strategies to overcome the challenges and exploit the opportunities experienced thus far in urban growth of Riyadh. Thereafter, the framework was taken through a testing and validation process during which these strategies/solutions were interrogated by a select group of respondents who had participated in the main study (residents, urban planning officials and academics/researchers). Through focus group discussions, the participants/respondents had the opportunity to propose rectifications to the framework by proposing more strategies or suggesting

the deletion of others. The researcher then included the proposals made during the testing and validation into the development of a final SU framework by adding more strategies while removing others. Figure 9-1 indicates the initial SU framework that was developed on the basis of the findings of the main study. On the other hand, figure 9-2 indicates the final SU framework with the additional strategies/solutions indicated in bold for each of the five dimensions. Furthermore, table 9-1 indicates the findings of the study in relation to each of the objectives insofar as the three categories of respondents are concerned.

Furthermore, Table 9-1 indicates the findings of the study in relation to each of the objectives insofar as the three categories of respondents are concerned.

Table 9-1: Compiled table of findings in relation to the objectives of the research

Main themes	Riyadh residents	Experts and researchers	Academics	Official Documents
Identify drivers and barriers to sustainable urbanisation	**Drivers:** ▪ Financial resources ▪ International migrants ▪ Economic boom ▪ Better education facilities ▪ Oil industry ▪ Political will	**Drivers:** ▪ Economic boom ▪ Increased population ▪ Increased community cohesion ▪ Strong government involvement and awareness	**Drivers:** ▪ Government involvement	**Drivers:** ▪ Economic boom
	Barriers: ▪ Environmental degradation ▪ Haphazard urbanisation ▪ Rapid population growth ▪ Outdated policies and regulations	**Barriers:** ▪ Poor community participation ▪ Urban sprawl ▪ Poor government supervision ▪ High prices of land	**Barriers:** ▪ Poor government intervention ▪ Poor urban planning	**Barriers:** ▪ Outdated means of communication ▪ Environmental pollution ▪ Poor government accountability ▪ Urban inequality

	▪ Poor coordination among urban planners ▪ Poor land allocation			▪ Low economic dynamism
Examine the social, environmental and historical factors affecting sustainable urbanisation in Riyadh and in KSA in general	**Social factors:** ▪ Changing demographic composition ▪ Migration ▪ Health status ▪ Increased population ▪ Arabic Islamic culture ▪ Community involvement ▪ Changing lifestyles	**Social factors:** ▪ Public awareness levels ▪ High population growth ▪ Poor social cohesion ▪ Increase in middle class ▪ Urban sprawl	**Social factors:** ▪ Social inequality ▪ Equal access to resources	**Social factors:** ▪ Socio-economic statuses ▪ Social inclusion or exclusion
	Environmental factors ▪ Climatic conditions ▪ Natural resource cover ▪ Increased pollution	**Environmental factors:** ▪ Environmental conservation efforts ▪ Waste management ▪ Water resource management	**Environmental factors:** ▪ Waste management ▪ Pollution ▪ Environmental conservation	**Environmental factors:** ▪ Land use ▪ Environmental degradation

	▪ Waste management strategies	▪	▪ Water resource management ▪ Energy efficient methods	
	Historical factors: ▪ Past urbanisation processes ▪ Urbanisation rate ▪ Historical sites	**Historical factors:** ▪ Islamic architectural designs	**Historical factors:** ▪ Past urbanisation processes	
Identify the challenges of sustainable urbanisation and sustainable living in Riyadh	▪ Poor departmental cohesion ▪ Ineffectual urban planning regulations ▪ Lack of citizen participation ▪ Rapid population growth ▪ Haphazard urbanisation	▪ Outdated urbanisation policies ▪ Rapid population growth ▪ Lack of coordination among government officials ▪ Lack of community engagement	▪ Poor interventions ▪ Inadequate public service facilities ▪	▪ Outdated policies ▪ High cost of living ▪

Identify impact of rapid urbanisation on desert and arid land	▪ Increased urban population ▪ Outdated urban plans ▪ Administrative challenges ▪ Changes in land use ▪ Environmental degradation	▪ Natural hazards ▪ Increased environmental pollution ▪ Land reclamation ▪	▪ Environmental impacts e.g. poor waste management, increased water ▪ Social impacts e.g. increased population, urban expansion and demographic changes	▪ Environmental degradation ▪ Inconsistent government responsibility ▪ Urban sprawl
Examine impact of sustainable urbanisation on improving quality of life	▪ Equal distribution of resources ▪ Better urbanisation policies ▪ Improved public infrastructures ▪ Increased job opportunities ▪ Better environmental management	▪ Better urbanisation policies ▪ Increased job opportunities ▪ Equal distribution of resources ▪ Improved public infrastructures ▪ Enhanced community involvement ▪ Better environmental management	▪ Improved social conditions ▪ Government intervention ▪	▪ Gender and income equality ▪ Cleaner environment

Propose a sustainable urbanisation framework capable of being integrated into future development of urban areas within KSA	▪ Increasing citizen participation ▪ Sustainable urbanisation policies ▪ Improved service delivery	▪ Better urban planning strategies ▪ Improved quality of life ▪ Increased community involvement ▪ Better departmental cohesion	▪ Multisectoral involvement ▪ Government intervention	▪ Sustainable urban practices ▪ Sustainable urbanisation framework

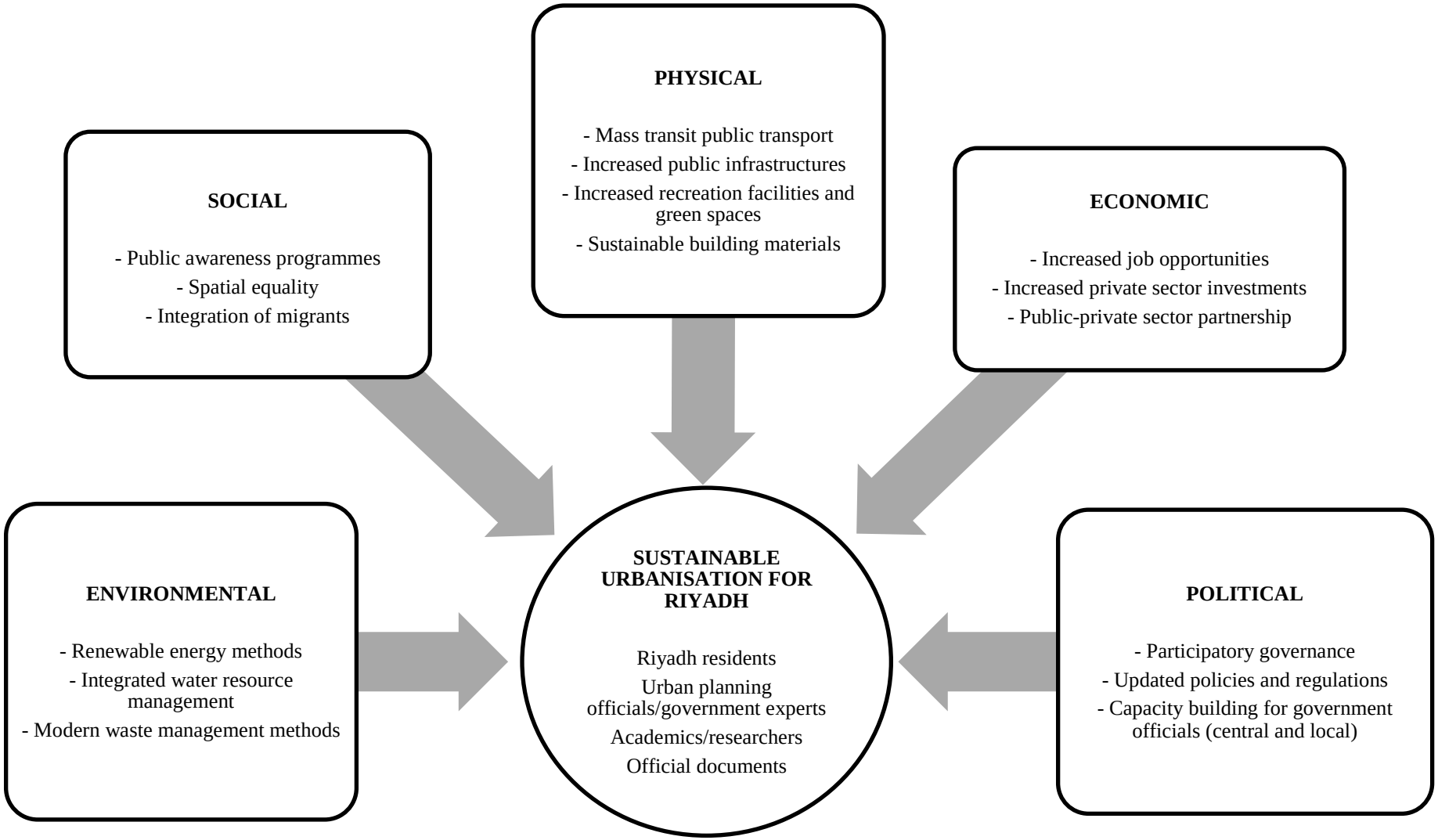


Figure 9-1: Initial proposed SU framework based on findings of the main study

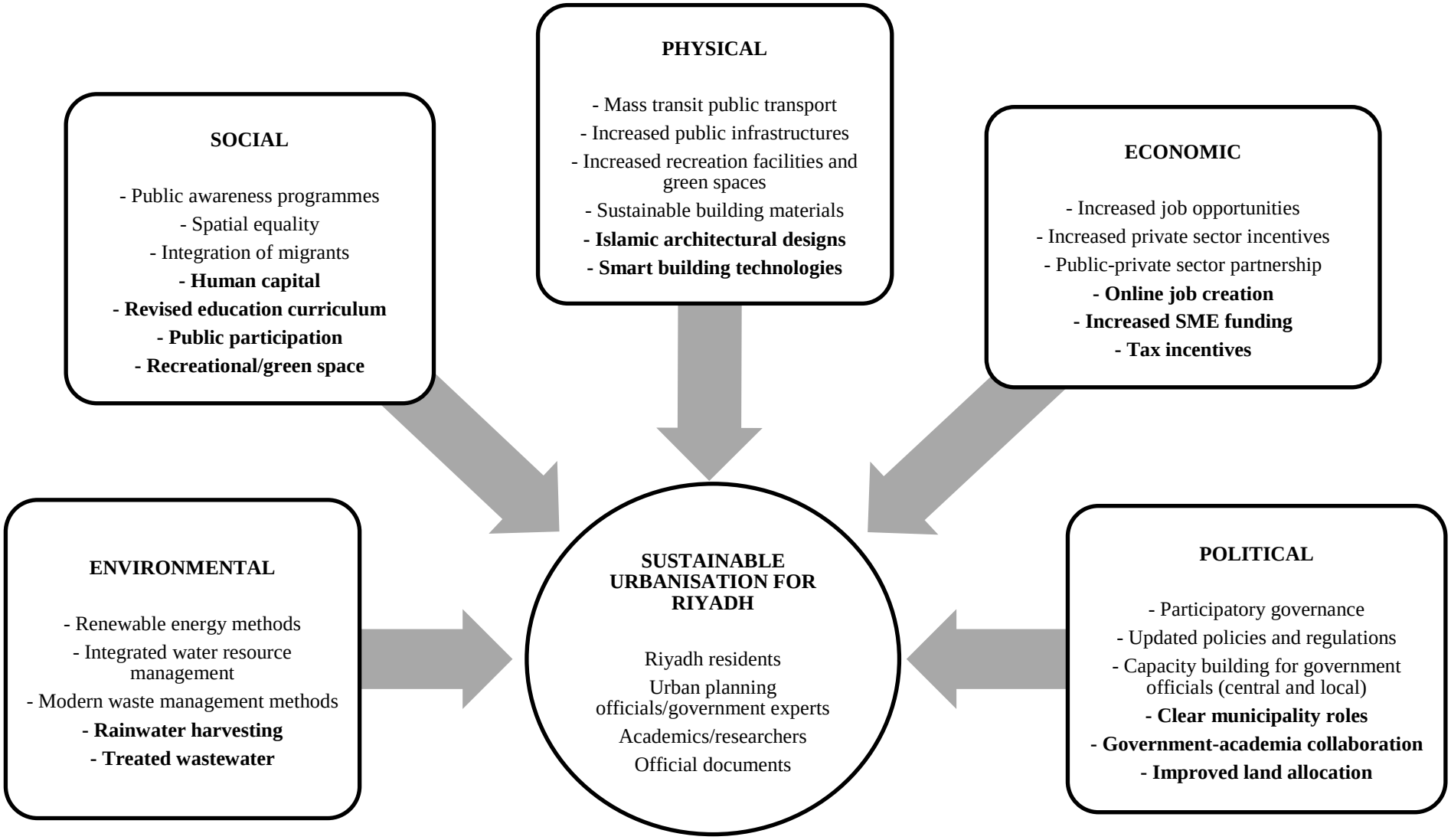


Figure 9-2: Revised sustainable urbanisation framework consisting of all four groups

9.3. Physical dimension

One of the recurrent strategies across the four categories of respondents – as far as physical dimension is concerned – is the increased recreational facilities and green spaces. As Almayouf (2013) states, Riyadh has one of the lowest green spaces per square metres in the world. Furthermore, the number of recreational parks is minimal in comparison to the space used to build residential properties. Increasing the number of recreational facilities and green spaces will contribute towards a sustainable community by enhancing social integration and environmental sustainability. UNDP (2016) notes that recreational facilities can enhance social cohesion and reduce spatial inequality by bringing together people of different socio-economic statuses.

In light of the housing problem affecting Riyadh, sustainable building materials feature prominently across the four groups as a strategy for alleviating this problem. Al-Surf et al. (2013) advocate for the adoption of smart technologies, such as solar energy systems, in the construction of modern houses in Riyadh. The use of these energy efficient methods would go a long way in enhancing economic advancement by creating more jobs in the construction sector as well as enhancing environmental sustainability through the use of these sustainable building materials.

One of the issues that was apparent during the testing and validation of the framework was the need to inculcate Islamic architectural designs into sustainable housing. Some of the participants in the FGDs to test and validate the framework pointed out that most modern residential buildings in Riyadh and KSA in general do not consider Islamic architectural designs that allow privacy for the occupants of such houses. Indeed, Al-Surf et al. (2013) notes that one of the social challenges to sustainable housing has been the family-oriented culture of Saudi families where privacy is an important consideration. Regardless of the features of sustainable housing, it is important that the design of such houses consider the cultural ways of the intended occupants or the target consumers – in this case, Saudi citizens. Typically, with regards to privacy, a house for a Saudi family is subdivided into three distinct areas depending on the interactions between the different family members. The first is the private area that is normally used by inner family members, such as the mother and father whereas the second is the semi-private area where all the family members interact, such as the living room (Al-Surf et al. 2013). The third area may be a guest room or a public meeting area for male family members. In addition, Islamic houses are designed looking inwards with outside walls that are often featureless to prevent strangers from peering inside (Al-Surf et al. 2013). Other Islamic architectural designs that sustainable housing should consider include Mashrabiya – a decorative screening of windows – as well as inner courtyards. Sirryeh (2018) notes that there are several features of Islamic architecture that can be borrowed and

incorporated in sustainable housing. One of these is *Mashrabiya*, which is essential in providing natural lighting while blocking the harmful UV rays from penetrating into the house. This architectural design ensures privacy whilst allowing light to penetrate into the house, in addition to regulating air flow into and outside of the house. Another feature is the *malqaf*, which helps improve natural ventilation by cooling the house and getting rid of moisture. Sirryeh (2018) notes that the *malqaf* sieves and prevents dust particles that are carried by wind from entering the house.

One of the hindrances to the realisation of quality housing – especially where middle and low-income families are concerned – is poor government supervision of the building code. Al-Surf et al. (2013) point out that the Saudi Building Code (SBC) was not publicised effectively among the Saudi public as well as relevant government agencies concerned with urban planning. Consequently, adherence to the SBC by private developers has not been at the desired level. In order for the government to improve on its supervision of the SBC, public awareness campaigns are important to enlighten different stakeholders on the importance and benefits of adhering to this code. One of the reasons for the poor implementation of SBC has been the scant information on the Saudi Building Code National Committee (SBCNC). Al-Surf et al. (2013) note that SBCNC did not conduct enough awareness campaigns even within the construction industry to enlighten stakeholders on its mandates. In light of this, it is important that awareness campaigns on the SBC should rope in designing firms or private developers in the construction industry. Use of the traditional media will help get this message as far as possible, including increasing awareness levels among members of the public (Al-Surf et al. 2013). Concerning the implementation of the building code, the government should widen its supervision to old housing projects before the 1950s and 1960s to ensure that they adhere to the code. Al-Surf et al. (2013) suggest that old houses should be renovated to ensure that they attain the minimum level of the SBC. Adherence to the building code will subsequently solve local environmental issues by ensuring that the houses constructed are environmentally sound and do not pose a threat to the natural resources for the benefit of future generations.

Ledraa (2015) notes that Riyadh has been hugely dependent on the use of private cars as the chief mode of movement at the expense of walking. Similarly, many of the respondents in the study lamented about the lack of enough walkways to encourage Riyadh residents to adopt a walking culture. The reluctance to adopt walking as a means of transport has been further motivated by the harsh climatic conditions of the municipality and KSA in general. To improve walkability, the municipality needs to undertake several infrastructural improvements. One of these strategies is to increase the tree cover in the municipality by planting more trees. The impact of trees in improving the walkability is that they will improve air quality in the city by reducing emissions. Furthermore,

they will help residents cope with the ravages of the harsh weather by providing them with natural cooling while minimising the energy demand for air conditioning. From an environmental perspective, planting of more trees will minimise stormwater pollution. In areas that have walkways, the municipality should apply several strategies to improve walkability. Ledraa (2015) notes that the general factors that determine the walkability of a street, neighbourhood or areas include safety, proximity, convenience, land use mix and density. Residents may be more inclined to walk if the basic amenities or services that they require are in close proximity to their neighbourhood. Furthermore, they need to walk in the streets feeling safe and comfortable in the knowledge that they are not at a high risk of being knocked down by a car or mugged in the street. Concerning density, neighbourhoods that have high walkability may be those that have high density compared to those with low density. Ledraa (2015) points out, for instance, that traditional inner neighbourhoods in Riyadh have high walkability scores because they boast diverse economic activities and liveliness occasioned by the presence of many people. The presence of varied businesses and different people creates a perfect pedestrian ambience that makes walking attractive. In areas where walkability is low, the municipality may have to construct more sidewalks and improve on safety. Examples of these areas in Riyadh in which residents have not efficiently adopted the walkability culture include neighbourhoods with minor residential streets, which usually lack sidewalks (Ledraa 2015). One of the key benefits of improving walkability is economic vibrancy created as residents interact with their surroundings. It will also aid in improving the air quality – particularly in Riyadh – where the emission of greenhouse gases is largely attributable to increased number of cars on the roads. Walkability will improve social cohesion by bringing people from different parts of the city and socioeconomic backgrounds into contact with each other.

9.4. Economic dimension

Across the four groups of respondents, the need for economic diversification comes out clearly. It is noteworthy that even within the royal family itself, the need for economic diversification has been noted hence the formulation of Saudi Vision 2030 and the National Transformation Plan (NTP). Diversification into non-oil sectors and increased private sector investment are one of the key pillars of both development plans. Al-Surf and Mostafa (2016) note that KSA seeks to borrow a leaf from other countries, such as Singapore, which has invested in human capital by equipping its youth with vocational skills to create their own job opportunities. This would help millions of Saudi youth attain economic advancement by using the skills garnered to create their own job opportunities; it would also boost the Saudi economy through increased taxes to the economy.

Furthermore, in this case, economic advancement and social integration are intertwined in that improved standards of living for many youths would reduce the income inequality in the kingdom.

During the testing and validation of the framework by academics, one of the points that came out was the strength of the Internet as a medium for creating employment opportunities. Similarly, Alshuaibi (2017) highlights the fact that KSA needs to invest in information technology (IT) if it is to achieve the objectives of the social and economic pillars of Saudi Vision 2030. He further notes that technological development will be an integral ingredient for trade connectivity, security, mining, education and communication. To realise its objective of becoming a centre of Arabic and Islamic cultures, the country needs modern technological growth to midwife the required changes and infrastructural development (Alshuaibi 2017). Apart from the prestige associated with Internet-related professions, such as computer engineering, software development and IT, the Internet itself is a platform through which people can interact with potential employers and access employment opportunities situated in other places beyond Riyadh. The Internet could be a solution to alleviating or mitigating the unemployment rate that has adversely affected many Saudi youths who constitute over 50% of the country's population. Therefore, there is a need to encourage the youth to look to the Internet as a platform for scouting for employment opportunities where they may be employed on contract basis. Adopting the Internet as a job search tool would not be a complicated task for Saudi youths many of whom have adopted the Internet as their major tool of communication. Murphy (2012) reveals that social media sites, such as Twitter, Facebook and YouTube have provided the youth in KSA with the opportunity to display their talents and ambitions. Furthermore, her interviews with various Saudi youths reveal that the Internet has widened their world view and encouraged them to think out of the box. This has been exhibited through several comedy skits that have been uploaded on YouTube (Murphy 2012). Thus, online job creation entails encouraging the youth to use their skills and knowledge acquired in schools to create jobs for themselves through an online platform. They have to be encouraged that the Internet has millions of potential clients or audience who would pay for certain content or services; all that they need to do is to identify their niche and a target consumer or audience.

From the government's perspective, it can increase employment opportunities by creating an enabling environment for small and medium enterprises. During the testing and validation of the framework by Riyadh residents, one of the issues raised was the challenges facing SMEs in KSA, including bureaucracy and lack of proper funding. With regards to bureaucracy, the Internet could midwife the growth of SMEs by eliminating the bureaucracy associated with activities, such as business registration and tax remittances. Alshuaibi (2017) notes that many SMEs have incurred a lot of costs related to registration and tax remittances. For many SMEs, these costs may be a

hindrance to their growth. These challenges highlight the need for the government to roll out many of these services on an online platform in order to enable these SMEs save on the time and costs associated with registration and running of a business in KSA. Alshuaibi (2017) highlights SMEs as an important avenue through which the government can increase employment opportunities for the youth. Nonetheless, this will be dependent on their ability to obtain registration as soon as possible with minimal bottlenecks.

With regards to SMEs, one of the issues that emerged during the testing and validation of the framework by the residents was the lack of funding of SMEs. Indeed, Waked (2016) notes that SMEs in KSA face a huge obstacle in obtaining loans from commercial banks many of who are reluctant to lend finances to entrepreneurs for varied reasons. One of these reasons is that most SMEs are unable to avail the adequate collateral required for loans. Furthermore, these banks are put off by the high transaction costs involved with the high risk of SME projects. Certain banks also fear the prospect of reduced profitability occasioned by the administrative costs of lending money to SMEs (Waked 2016). In other instances, the rationale for not lending loans to SMEs is the likelihood of these SMEs defaulting on the loans as a result of business challenges or failure. If many of their borrowers – in this case, SMEs – default on their loans, these commercial banks would incur an increase in their non-performing assets that would consequently dent their profits and business reputation.

Even though the government has tried to tackle this challenge by providing financing through the Kafalah scheme, many SMEs are still unaware of such financing schemes. Furthermore, Waked (2016) notes that the application for such loans is long-winding process that takes a long time before a final decision is rendered. To enable easier access to funds for SMEs, therefore, the government needs to minimise the bureaucratic process involved in the application for its loans. SMEs can also take advantage of other forms of Islamic finance; Waked (2016) proposes the *waaf*-based investment model in which Islamic investors can invest in SMEs that focus on community development and property. In the context of this research, such investments could focus on SMEs that specialise in sustainable development initiatives, including waste management or waste-to-recycling, natural resource conservation, renewable energy or sustainable housing. From the perspective of commercial banks, they can help spur the growth of SMEs by tailoring their loans to suit the requirements and capabilities of SMEs. Waked's (2016) indeed notes that many SMEs in KSA find that many commercial banks do not have tailored lending packages that fit their special needs. Considering that Islamic finance is the major way through which most SMEs desire to be funded, commercial banks would be encouraged to provide new Islamic loan products that are aligned to *sharia* law. Furthermore, Waked (2016) proposes that commercial banks need to

institute risk management strategies to counter the risks associated with the Musharaka and Mudaraba models that are often considered risky by most commercial banks when it comes to loans. One of these strategies is to arrange a profit and loss sharing plan between the commercial banks and the SMEs. This type of arrangement requires a long term relationship between SMEs and commercial banks. SMEs should consider developing an information system that would provide banks with the information required by banks regarding the risks faced by the SMEs. This could help improve their access to credit.

9.5. Environmental dimension

Reverberating across the three groups is integrated water resource management. This is important considering that water scarcity is one of the main threats facing Riyadh as its population continues to increase. A key component of an integrated water resource management is the prudent management of non-renewable water sources, such as groundwater and flood water. GAMEP (2017) notes the importance of rationalising water consumption rather than seeking to meet the increasing demands by constructing more water desalination plants. Part of the objectives of NTP is the improvement of groundwater and surface water quality. Thus, an integrated water resource management is crucial for enhancing environmental sustainability.

Also recurring across the three groups is renewable energy methods. One of the main environmental challenges confronting the city is pollution from various sources, such as cars, industrial and human waste. GAMEP (2017) reveals that the energy sector is responsible for 92% of greenhouse emissions in the country. Therefore, the adoption of renewable energy methods, such as solar and wind energy would help attain environmental sustainability by reducing greenhouse gases (GHG) emission by almost 130 million tonnes by 2030. It would also create economic advancement and better the health of residents through the use of clean energy that does not cause various diseases, such as respiratory illnesses.

Another environmental issue that was identified during the testing and validation of the framework by Riyadh residents was natural resource depletion. Indeed, it is noteworthy that one of the impacts of rapid urbanisation of Riyadh has been water scarcity occasioned by increased water consumption. In addition, as is the case of Wadi Hanifa valley, the rapid urbanisation has resulted in encroachment on water catchment areas, which poses a threat to water aquifers. Poor waste disposal has further heightened the risk of groundwater pollution through the seepage of untreated waste into the ground. All these challenges highlight the need for natural resource protection even as KSA seeks to propel itself into the same league as developed countries. As per Saudi Vision 2030 and NTP 2020, one of the strategies of natural resource protection would be economic

diversification by reducing the dependence on oil. Noteworthy is that one of the objectives of Saudi Vision 2030 is the investment in the youth as an avenue for economic diversification into the service industry as is the case for other countries, such as Singapore (Al-Surf and Mostafa 2016).

Equally important to include in the sustainable urbanisation framework insofar as the environmental dimension is concerned is rainwater harvesting. DeNicola et al. (2015) note that rainwater harvesting may be a solution to alleviating the water scarcity in Riyadh and KSA in general, which is expected to worsen as the population growth continues. Rainwater harvesting is not a strategy that should be practised by the government agencies alone but also the residents. However, adoption of rainwater harvesting would require public awareness campaigns to enlighten the public on the importance of rainwater harvesting and how to do it safely without polluting the water. It is also noteworthy that KSA derives a mere approximately 1 percent of its water supply from treated wastewater (DeNicola et al. 2015). It is therefore important that the concerned government agencies should increase the use of treated wastewater by employing modern technologies to treat wastewater that would otherwise cause pollution of groundwater sources, such as water aquifers.

9.6. Social dimension

Creating spatial equality is necessary to enhance social integration and economic advancement particularly for low-income households. Al-Surf et al. (2013) notes that the housing shortfall in Riyadh has pushed many migrants from the rural areas into informal settlements where the houses lack privacy and essential amenities. Spatial equality entails equal distribution of resources to the different parts of the city. Alshammari (2011) reveals that the northern part of Riyadh is synonymous with the high-income residents whereas the southern part consists of low-income residents who work in the nearby industries.

Public awareness programmes on sustainability is necessary to realise social integration as well as good governance and security. Al-Barrak (2016) reveals that public contribution or feedback to government services and projects is low. This reduces the chances of good governance because the authorities are not held accountable for their actions.

One of the issues discussed during the testing and validation of the framework by Riyadh residents was the need to invest in human capital as has been the case in countries, such as Malaysia and Singapore. Indeed, Al-Surf and Mostafa (2016) note that investment in human capital is an important strategy that the Saudi government must undertake if it is to realise the objectives of NTP 2020 and Saudi Vision 2030. In another study, Bokhari (2017) reveals a direct relationship between investment in human capital and economic growth. He expounds that investment in

human capital focuses on the improvement on education and training to create an eventual impact in the economic production and growth process. For Riyadh and Saudi Arabia to move towards sustainable development – and by extension, sustainable economic growth – the government should reform the education system with a view to making it market- oriented. This entails improving on the quantity and quality of skills that are imparted on the youth at different levels of education in addition to equipping them in other areas, such as innovations, research and development (R&D) and entrepreneurship (Bokhari 2017). It is noteworthy that the Saudi government has made significant strides towards the education sector, particularly with regards to improving female participation and enhancing access to educational opportunities for those in the rural areas. By 2017, the number of diploma graduates from vocational and technical institutions was 450,000, which was five times the number of graduates from these institutions in 2009 (National Industrial Cluster Program 2017).

9.7. Political dimension

During interviews with the four groups of respondents, urban planners' lack of knowledge on sustainable urbanisation was a major concern. Thus, capacity building for urban planners is a necessary strategy to realise good governance and security as well as social integration. Future Saudi Cities Programme (2016) notes that many of the urban planning officials within the municipalities and urban planning agencies are not knowledgeable on the modern methods of urban planning. Through university courses on sustainable urban planning, these officials can acquire skills on sustainable urban planning to realise social integration of the residents in the city.

Equally important is participatory governance that entails all stakeholders contributing to the sustainable urban planning process. These stakeholders include actors (architects and planners), politicians (government) and users (residents) all of whom will collaborate in the various stages of sustainable urban planning. One of these stages is the policy making process, which must be inclusive to enable the formulation of flexible policies that are tailor made for the issues at the grassroots. Participatory governance means that all stakeholders in the municipality are provided with a chance to make their voices heard insofar as different issues affecting urban planning and development is concerned. An example of a policy that has not fully allowed for participatory governance is the Law of Provinces Act of 1992. Also known as the Regions Act, the law was enacted to enhance provincial administration and development via local governments. It aims to improve urban and regional development through decentralisation at the provincial and local level in addition to meeting the needs of the people at these administration levels. However, Future Saudi Cities Programme (2017) notes that the councils do not have much say on the budgets for the different projects in their respective areas as this is the prerogative of the highest level of

governance. Consequently, many municipalities may be hamstrung by insufficient financial resources allocated to them compared to the projects that would meet the needs of their residents. Future Saudi Cities Program (2017) further points out that this policy can create a conflict of interest because it gives the central government the powers to replace a member of the councils, dissolve the council or select contractors to undertake local projects.

Therefore, participatory governance should give stakeholders the opportunity to influence the allocation of budgets to the different projects. This would help attain good governance by holding the urban planning officials accountable for the roles and responsibilities. This method of urban planning would also contribute to the other interconnected objectives for realising a sustainable community. For example, it would create social integration by bringing together different stakeholders from different backgrounds. The policies and guidelines developed would also create economic advancement through creation of jobs and enhance environmental sustainability.

9.8. Conclusion

The following are key points that have emerged from this chapter:

- Public awareness is the key to enhancing the adoption of various sustainable practices, such as green building, rainwater harvesting, SME funding and walkability;
- The Internet is a timely tool that could be used to create awareness on sustainable development in addition to enabling the youth access job opportunities. Already, the uptake of the Internet – via social media – among the youth has been exponential;
- Walkability has been ignored by the municipal authorities in favour of expanding the road transportation network. However, there is need to encourage a walking culture to reduce reliance on private automobile and encourage social cohesion. Walkability can improve through the increase of tree cover to improve air quality and constructing more pedestrian pathways. The government should also build more basic amenities (e.g. hospitals, malls and schools) closer to the neighbourhoods; and
- Economic diversification into non-oil sectors would help preserve natural resources, such as water, wildlife, groundwater reservoirs and air quality;
- The government should encourage participatory governance in policy making process unlike the case of the Law of Provinces Act (1992) that was formulated exclusively at the top echelons of government without the input of the public. Participatory governance will allow all stakeholders to contribute to policies through suggestions that are informed by empirical evidence from the grassroots. The result will be urbanisation policies that are efficient for tackling sustainable urbanisation-related issues.
- Participatory governance does not only mean that stakeholders voice their needs and demands but also influence the budgetary allocations towards different projects; and
- Investment in human capital will provide the youth with the skills and knowledge to pursue their ambitions and hence spur economic growth. The government needs to reform the education sector to inculcate skills on entrepreneurship, innovation as well as R&D.

CHAPTER 10: DISCUSSION AND RECOMMENDATIONS

10.1. Introduction

This chapter was divided into three main sub-sections; the first sub-section was a discussion of the major findings and summarises the conclusions from the first 10 chapters by narrowing down to the major issues identified from these preceding chapters. Consequently, the following issues were identified from the conclusions made in the preceding 10 chapters: access to public services and facilities; poor community participation; poor urban planning policies and legislation; environmental degradation and rapid population growth. Before delving on these issues, the first section summarises the main findings of the study. The second section delves into a discussion of these issues by evaluating the findings, comparing them to related studies from worldwide and dissecting the concepts related to these issues. Based on the findings, the last sub-section provides recommendations to counter the identified challenges to sustainable urbanisation as well as recommendations on how to harness the opportunities presented by urbanisation. The chapter also provides recommendations for further study.

The study's main objective was to identify the issues facilitating or inhibiting sustainable urbanisation and living in Riyadh. Specifically, the study sought:

- To identify and examine the economic, social and environmental factors of sustainable urbanisation (SU);
- To examine the drivers and barriers to sustainable urbanisation in desert cities, such as Riyadh;
- To identify the challenges in planning for sustainable urbanisation in Saudi Arabia;
- To propose a sustainable urbanisation framework to inform future development of urban areas within Riyadh and other desert cities.

10.2. Discussion

10.2.1. Major findings

As mentioned in the previous section, the study had four core objectives that it sought to fulfil. Consequently, these objectives were pursued through secondary and primary data collection processes involving literature review and in-depth interviews respectively. Primary data was collected by administering questionnaires to respondents; the 25 questions – though different for each category of respondents – were coalesced around 6 thematic areas that were developed from the four research objectives. The major barriers to sustainable urbanisation as identified by the three categories of respondents include the following: poor community participation; poor urban planning policies and regulations; poor government supervision, environmental degradation;

haphazard urbanisation; and poor urban planning. These findings are in response to the first thematic area, which was 'drivers and barriers of sustainable urbanisation in Riyadh'. Both academics/researchers and urban planning officials/experts agreed that poor government supervision is a key barrier to sustainable urbanisation in that the urban planning practices adopted by the concerned agencies have been ineffective in managing the ravages of the rapid urbanisation rate. Riyadh residents identified environmental degradation as a major barrier to sustainable urbanisation, which manifests itself via emission of greenhouse gases, poor waste disposal and depletion of natural resources, such as water aquifers. Furthermore, both academics/researchers and urban planning officials/experts agree that poor urban planning policies and regulations will inhibit the progress of sustainable urbanisation in Riyadh. The respondents felt that the current policies, such as the Law of the Provinces Act (1992), do not reflect the current state of affairs insofar as urbanisation-related issues are concerned.

The other half of the aforementioned thematic area was to identify the drivers of sustainable urbanisation in Riyadh. Political will, increased government involvement, economic boom, international migrants and abundant resources were identified as the drivers of sustainable urbanisation across the three categories of respondents. Urban planning officials/experts and Riyadh residents pointed to the economic blueprints formulated by the government, such as Saudi Vision 2030 and the NTP 2020 as evidence of the political will of the government to realise sustainable projects in Riyadh and KSA in general. Despite their impact on the population growth in Riyadh – and subsequent effect on house prices – many residents perceived that international migrants have useful ideas on sustainability that the natives can borrow.

The second thematic area the 'improving the quality of life' insofar as the role of sustainable urbanisation in improving the quality of life for Riyadh residents is concerned. In fulfilment of this objective, the study identified the following issues/consequences of sustainable urbanisation insofar as the quality of life is concerned: better urbanisation policies; better environmental management; improved public services; better housing; improved public services; equal resource distribution; increased job opportunities; improved social conditions; and improved government intervention. Both urban planning officials/experts and academics/researchers noted that sustainable urbanisation can improve the quality of life by providing residents with more access to necessary public services, such as water and energy. On their part, Riyadh residents noted that sustainable development will create more employment opportunities that will help reduce the employment rate. Through the adoption of sustainable housing materials, the residents also perceived that sustainable urbanisation would result in better and affordable housing. Additionally, urban planning officials/experts pointed out that adoption of sustainable methods would enhance

better environmental management through the reduction of air pollution, water conservation and better waste management. On their part, Riyadh residents noted that sustainable urbanisation would enhance equal distribution of resources among the residents of Riyadh.

The third thematic area of the study was 'social, environmental and historical factors affecting sustainable urbanisation in Riyadh'. The environmental factors identified during the study included the following: water resource management; environmental conservation efforts; climatic conditions; increased pollution; waste management; and water resource management. Both academics/researchers and urban planning experts/officials noted that water resource management would affect sustainable urbanisation by determining the amount of water available for consumption by the residents. Residents pointed to the climatic conditions of Riyadh as an arid area as an environmental factor that will influence the successful adoption of sustainability practices. On the part of the urban planning experts/officials, they pointed out that the current environment conservation efforts spearheaded by the General Authority on the Management of Environment (GAMEP) would complement sustainable urban development through preservation of natural resources, reduction of air pollution and improved waste management, among others.

The social factors affecting sustainable urbanisation as identified during the study included the following: public awareness levels; high population growth; community involvement; changing lifestyles; social equality (or inequality) or gender equality. Urban planning officials/experts pointed out that a highly enlightened public insofar as sustainable urbanisation is concerned would be more involved in sustainable urban planning and development. Similarly, Riyadh residents noted that sustainable urban planning and development would succeed if the residents were highly involved in its planning and implementation. Urban planning officials/experts also pinpointed the high population growth as a social factor affecting sustainable urbanisation by increasing the consumption of resources, such as water, energy and health services. Closely related to population was changing lifestyles, which was mentioned by many residents as another social factor affecting sustainable urbanisation. The residents noted that many Saudi youths have adopted part of western lifestyles like moving out of their main families, which has subsequently increased the demand for housing. Academics mentioned gender equality as a key social factor that will affect sustainable urbanisation by enabling women to effectively contribute to sustainable urban planning and implementation.

Regarding the historical factors, the study identified past urbanisation processes, history and heritage of Riyadh and historical sites as the key factors that will influence sustainable urbanisation from an historical perspective. The respondents noted that the past urbanisation processes that have been haphazard in the face of rapid urbanisation may set a bad precedence for sustainable

urbanisation. The fact that the residents of Riyadh are majorly Muslims was also noted as an influential historical factor on sustainable urbanisation. Some of the respondents pointed out that this Islamic influence should be reflected in the architectural design and some of the strategies adopted insofar as sustainable urbanisation is concerned.

The fourth thematic area was 'challenges in planning for sustainable urbanisation'. Subsequently, the study identified the following challenges faced by different stakeholder in planning for sustainable urbanisation: outdate urbanisation policies; rapid population growth; lack of coordination among urban planners; poor departmental cohesion; inadequate public facilities; poor interventions; and inadequate public service facilities. Both academics/researchers and residents were unanimous that the inadequacy of public service facilities, such as health, may prevent the realisation of social equality due to lack of equal access to these facilities for all residents. Urban planning officials and residents also concurred about poor departmental cohesion/coordination as a key challenge in planning for sustainable urbanisation. The general perception of the two categories of respondents was that the various stakeholders concerned with urban planning were not working in conjunction with another; rather they were working at cross purposes. The rapid population growth was also noted as a challenge because the demand for services and goods in the city would keep increasing each year thus pushing residents to adopting unsustainable methods to meet these needs, such as depletion of water aquifers, poor waste disposal and non-renewable energy.

The fifth thematic area of the study was 'impact of rapid urbanisation on arid areas' – a category in which Riyadh belongs to due to its climatic condition. The impacts of rapid urbanisation on arid and semi-arid areas as identified include the following: natural hazards; increased environmental degradation; land reclamation; increased urban population; and strained public infrastructures. All the categories of respondents were unanimous that rapid urbanisation has increased environmental degradation in Riyadh through the depletion of the few water aquifers that are available in the Wadi Hanifa valley. Regarding land reclamation, the respondents pointed out that urbanisation has increased the urban boundaries of Riyadh as its population increases and the demand for more land increases. Lastly, the study sought to propose a SU framework capable of being integrated into the future development of urban areas in KSA. To this end, interviews with the categories of respondents identified various strategies that can form the pillars of a SU framework. These strategies include: better urban planning strategies; increased community involvement; sustainable urbanisation policies; and improved government intervention. The three categories of respondents were unanimous that there is need for better policies that clarify the roles of the different stakeholders in urban planning in order to provide clear guidance in this area. Furthermore, all the

three categories of respondents identified increased community involvement as a strategy for integrating sustainable urbanisation into future development projects.

10.2.2. Interpretation of findings

- *Poor community participation*

That poor community participation was an issue reverberating across the interviews with the categories of respondents is not a surprise considering that it is a challenge that has been witnessed in other cities in developing countries insofar as urban planning is concerned. Mahjabeen et al. (2009) note that poor and disadvantaged groups in various cities are often excluded from the planning process of their cities. This is especially the case when these programmes and planning processes are located in the hands of the elite political and bureaucratic structures (Mahjabeen et al. 2009). Such was the case in Riyadh as attested to by the comments of various respondents who pointed out that policy formulation is conducted at the upper echelons of governance (the central government) and then the resultant policies are passed down for implementation at the local level where these policies may not be relevant to the needs and situation of the residents. Indeed, UNDP (2016) notes that lack of participatory governance allows for the capture and collusion of power by an elite group within a city who subsequently determine the direction of urban planning and implementation, which may mostly be inclined to favour this elite group. In their study on the level of community involvement in the formulation of the Sydney Metropolitan Strategy (SMS), Mahjabeen et al. (2009) discovered that the participation of aboriginal and non-English speaking residents in Sydney was virtually non-existent. Instead, the decision on the SMS was made by politicians and bureaucrats in the city without much input from the aforementioned poor and disadvantaged groups. This situation mirrors that of Riyadh in that the policies formulated on urban planning have involved little or no input from the local residents; rather these policies have been formulated by the central government, which is headed by the King. Without their input in the policy making process, the disadvantaged groups are at further disadvantage insofar as access to public facilities and resources are concerned. Lack of public participation in urban planning and implementation is the starting point of social and spatial inequalities because the resultant policies and processes do not cater for the needs of the disadvantaged groups/residents compared to the elite (politicians and bureaucrats) who were involved in the policy making process.

On the other hand, UNDP (2016) notes that participatory governance enhances social and spatial equality by ensuring that the needs and concerns of all stakeholders in urban planning are catered for in urban planning and development. Similarly, UNDP (2016) points out that participatory governance is essential in creating a knowledgeable and informed citizenry that is actively

involved in managerial and governmental issues. Furthermore, it enhances social cohesion by fostering collective concern for issues affecting the residents. UNDP (2016) identifies two categories of community participation either of which mirrors the level of public participation in urban planning and development in Riyadh. The first category is a top-down process in which the state, politicians and bureaucrats have predetermined development objectives that are then passed down to the community to help achieve the same. The second category is the bottom-up decision making process in which the community assumes control of its decisions. In this situation, the policy direction assumed by the concerned agencies or government officials is influenced by the needs and concerns of the citizenry. Considering that many respondents identified low levels of community involvement as an impediment to sustainable urbanisation, it is clear that public participation in Riyadh's urban planning and implementation fits in the first categories. Apart from the two categories of public participation, UNDP (2016) notes that different cities have varied levels of public participation in urban planning and implementation. In the first level – known as public right to know – the community is simply informed about the existence of an urban planning issue without the opportunity to participate. Informing the public is the second level of participation in which the authorities simply conduct awareness of the urban planning issue without the public getting the opportunity to express their concerns or suggestions. At the third level – known as public right to object – the residents may provide their opinions on the issue although these opinions may not necessarily be considered in the amendment of the policy. The fourth level – public participation in determination of interests, actors and agenda – is the first real form of participation. At this level, the public play a proactive role in influencing the issues that should be catered for as well as the stakeholders to be involved in the process (UNDP 2016). Assessment of consequences and recommending solutions is the fifth level of public participation in which the community has the chance to evaluate the consequences of various decisions and subsequently recommend solutions to be implemented. At the sixth level – public participation in final decision – the city residents have voting rights to either reject or accept the urban planning policies and programmes. In Riyadh's context – as well as KSA in general – the level of public participation resonates with the second level in which the community is simply enlightened about the existence of an urban planning and programme issue. Indeed. Future Saudi Cities Programme (2016) points out that urban planning in KSA is characterised by low level of public participation.

- *Environmental degradation*

For many cities worldwide, environmental degradation is a trade-off of urbanisation and it seems that that is no different for Riyadh. Its population growth has heightened the demand for water and energy of which consumption. Subsequently, overconsumption prompted the construction of

desalination plants, which have further increased the consumption of energy and the emission of fossil fuels into the air and high emission of greenhouse gases. Most affected in this regard has been the air quality that is already being depleted by the emission of greenhouse gases through the exhaust fumes of the many private cars that occupy the transport network. Indeed, the problem of greenhouse gases emission will not abate in the near future considering the ADA's projection that the number of vehicular trips will increase by 2030. From 7.4 million vehicular trips per day in 2015, the number will increase to approximately 15 million by 2030 (ADA 2015). That water scarcity is a huge problem to Riyadh residents in the face of its increasing population is not surprising considering that it is an arid area. As the demand for water continues to increase, the city's groundwater resources, such as the water aquifers are in great danger of depletion. Riyadh's urbanisation has also come with the cost of increased municipal waste that the municipality has struggled to efficiently handle. Electronic and medical hazardous waste have been the face of this increased amount of municipal waste as the authorities grapple with how to safely dispose of this waste without harming the environment.

Nonetheless, the environmental dilemma facing Riyadh has been witnessed in other cities before, including the developed ones. McGranahan and Satterthwaite (2014) mention the example of Europe and North America in the 19th century during which their urbanisation was characterised by a lot of environmental degradation that generated public health problems, such as cholera outbreaks and waterborne pandemics. Furthermore, the two note that the most economically developed cities in the world have been afflicted by air pollution as was the case with the 1952 Big Smoke of London that caused thousands of death and halted rail, road and air transport. Closer home to KSA, other cities in the Gulf region have been grappling with environmental challenges of their own as a result of rapid urbanisation. The fact that KSA shares similar environmental tribulations with its GCC peers – UAE, Oman, Qatar and Bahrain – is attributable to the fact that the region experiences arid climate. Additionally, all the countries are top producers of oil at the global level and rely on oil as a source of energy. Ramadan (2015) notes that GCC countries have expended a lot of energy towards the construction of water desalination plants to alleviate the water scarcity that has become synonymous with the region due to its arid climate. The region has been traditionally dependent on shallow water aquifers and non-renewable fossil water in deeper water aquifers. Just like Riyadh's case, the water scarcity has been worsened by the increased demand for water resources owing to increased population in the respective cities. Compared to advanced economies in which water consumption levels vary between 150-250 litres per day, the water consumption levels in KSA and Qatar vary between 250-400 litres per day (Ramadan 2015). Statistics further indicate that there is a disconnection between the water reserves available and

this level of consumption. In Kuwait, the water consumption per capita increased by 336% in 1992-2010 whereas the UAE experienced a 125% increase in 2006-2008. On the other hand, water consumption per capita increased by 120% in 2005-2009 in Muscat while Bahrain experienced a 120% increase within 8 years (2000-2008). Considering that GCC region is one of the most water-scarce areas globally, it is no surprise that it constitutes five out of the ten countries globally with the lowest per capita renewable water supply (Ramadan 2015). Closely related to water consumption is energy consumption that has increased in other GCC cities as is the case with Riyadh. Ramadan (2015) notes that energy consumption has generally increased by 6% per annum in the GCC cities. Notwithstanding this increase in energy consumption, these cities have been supplying electricity to residents at cheaper prices (approximately USD 0.04 kWh) than the costs incurred in producing the electricity (approximately USD 0.12 per kWh); this has been enabled through the use of energy tariffs with the exception of Sharjah Electricity and Water Authority in the UAE that drastically increased electricity prices in 2009. As is the case with KSA, the high energy consumption has culminated in increase carbon dioxide emissions. Ramadan (2015) reveals that Bahrain, Kuwait, Qatar and the UAE were the first, third, fourth and fifth highest CO_2 per capita producers globally in 2007.

- *Rapid population growth*

The case of urbanisation in Riyadh proves that increased population is the face of urbanisation; it is the key feature of urbanisation. Population growth is also the starting point of the many challenges and opportunities that emanate from urbanisation. Out of an increased urban population has come from several challenges, such as environmental degradation, strained public infrastructures, increased waste, shortage of housing, social and spatial inequalities, among others. This has been witnessed in the case of Riyadh as its population increased from 14,000 in 1910 (when it was still a small tribal village) to 8 million residents in 2016 (as per the 2016 Demographic Survey). Bajaber (2017) points out that the municipal authorities were ill-prepared to handle the needs and demands of the increasing population as attested to by the shortage of affordable housing. Indeed, Susilawati and Al-Surf (2011) note that Saudi Arabia has the largest shortfall in housing in the Middle East and North Africa (MENA) region. Nonetheless, the challenges occasioned by the increase in urban population does not place Riyadh is a league of its own insofar as poor urban planning is concerned. Urbanisation has been mainly a spontaneous process for many cities that find themselves grappling with the increased urban population and its challenges within no time.

Migration is another facet of population growth that has featured in the discourse on urbanisation. It is no wonder that it was constantly mentioned as a key social factor that impacts sustainable urbanisation in Riyadh. Tacoli et al. (2015) note that rural-urban migration contributes significantly to urban population growth rate as more people troop to urban centres in search of economic, educational and health opportunities. The economic growth in urban centres is often a pull factor for many rural migrants; this is the case for Riyadh, which experienced an upturn in its economic growth as a result of the oil boom. Consequently, many rural migrants moved from the rural areas where the economic conditions were harsh in search of opportunities in Riyadh, which was experiencing a lot of infrastructural developments. Furthermore, rural-urban migration is evidence of the regional inequalities that exist between the urban centres and the rural areas. Al-Bassam (2012) notes that the major Saudi cities of Riyadh, Jeddah, Mecca, Medina and Damaam have received the lion's share of infrastructural developments and investments compared to other areas in the kingdom. On the other hand, traditional farming – which has been the major economic activity in rural areas – has become less lucrative owing to the climatic conditions in the kingdom. Most of the migrants – who are the youth – have been subsequently attracted to the prospect of economic advancement that is offered by urban centres. This trend of rural-urban migration in Riyadh is a manifestation of the situation in other developing countries insofar as internal migration is concerned. Tacoli et al. (2015) note that economic opportunities at the destination (urban areas) are a common pull factor for migration from the origin (rural areas). Even though many of the rural migrants perceive rural outmigration as a migration out of poverty, this is not usually the case when they arrive at their destinations. Upon arrival at their destinations/urban centres, these migrants are often confronted with myriad challenges, such as lack of affordable housing, lack of access to social services (e.g. health, education), and lack of employment opportunities. Indeed, in their study, Susilawati and Al-Surf (2011) note that rural-urban migration has contributed significantly to a shortfall in the housing sector compared to the increased demand for the same. In most cases, increased rural-urban migration has created frictions between the natives and the migrants in many developing countries as the competition for resources and employment opportunities heighten between the two parties. Al-Bassam (2012) notes that as is the case in Saudi Arabia, the policy in many developing countries has been to discourage migration to the urban centres in a bid to minimize the demand for public services and employment opportunities. Nonetheless, these efforts have often been unsuccessful in stemming rural-urban migration. On the other hand, UNDP (2016) advocates for migrant integration as a way of harnessing the opportunities presented by migration. Many migrants come with innovative ideas or approaches to various issues that could be shared with their native counterparts to transform

their way of living for the better. Indeed, it is noteworthy that many of the respondents interviewed extolled the role of international migrants in enhancing sustainable urbanisation by providing ideas on sustainable urbanisation from their origins, especially in the case of international migrants who come from countries that have succeeded in enhancing sustainable development.

- Poor urban planning policies and legislation

The results of the study have indicated that relevant urban planning policies and legislations are necessary to enable urban planning stakeholders realise the opportunities borne out of urbanisation. The interviews with the different categories of respondents indeed corroborate the findings of previous studies that have pinpointed the lack of relevant urban planning policies as an impediment to sustainable urban planning. A study on the challenges afflicting AMANAHs in fulfilling their roles in urban planning revealed that the biggest challenge encountered is the obsoleteness of urban planning legislation (UNHABITAT 2016). The study revealed that the problem is not only exclusive to Riyadh but also to other KSA cities where the legislation does not cater for the current issues related to urban planning. One of the impediments noted in other countries as far as urban planning and implementation is concerned is lack of coordination among the agencies or departments tasked with this responsibility. In many cities in the developing countries, policy formulation and development of strategic plans for urban development are fragmented (Renaud 1981) Implementation of urban policies is a sectoral process in which each stakeholder or agency involved in urban development works in compartmentalisation and in separation from other stakeholders. This statement indeed brings to fore the situation in Saudi Arabia where urban planning and development has been a fragmented process where the different agencies involved in urban planning operate as silos. Furthermore, in relation to the poor urban planning policies, one of the findings of the study was that there is a lack of coordination among the urban planning officials at MOMRA and those at the municipality level. This has been the same case in other developing countries, such as Peru, where the institutions involved in planning do not coordinate their activities (Renaud 1981).

The fact that the study identifies outdated urban planning policies and legislation as an impediment to the realisation of sustainable development is evidence of the pitfalls of the technocratic model of policy making. Future Saudi Cities Programme (2016) notes that the current mode of urban planning is a technocratic one in which little attention is paid to the delivery of the policies insofar as meeting the needs of the residents is concerned. Most of the attention is paid to land use regulation as well as zoning control instead of laying emphasis on the management and phasing of the development projects. Freire (2006) points out that most cities in the developing countries have

adopted the technocratic model of urban planning, which limits public participation or input in key decisions related to the welfare of these cities. Also known as master planning, this form of urban planning was borrowed from 19th Century Western European planning through various avenues, such as colonialism, intellectual exchange and market expansion. It is noteworthy that in the case of Riyadh, the task of urban planning was initially entrusted to expatriate companies: Greek company Doxiadis Associates that created the First Master Plan and SCET that created the Second Master Plan. Both master plans were subsequently developed without the input of Riyadh residents; many years down the line, it is evident that the master plans have contributed to urban sprawl and perpetrated a horde of urbanisation-related challenges including environmental pollution, traffic congestion and inadequate housing, among others. The adoption of master planning has not only caused challenges for Saudi Arabian cities but also for other cities in the developing countries. Buehler (2003) reveals that the major disadvantage of this technocratic model is that it lays a foundation for spatial and social marginalisation in that it does not fully accommodate the needs and way of life of the majority of the city residents. Moreover, the mode of urban planning does not take into consideration the 21st Century challenges that face many cities, including oil dependence, food insecurity, informal settlements and climate change. In the case of Riyadh – and indeed in the case of KSA – it is noteworthy that the use of master planning occurred against the backdrop of the oil boom. Subsequently, the city has benefitted from infrastructural development projects that were funded by the revenues generated from oil exports.

Challenges that have resulted from the application of outdated urbanisation policies and legislation have further heightened the need for urban planning to factor the demographical, economic, socio-spatial and environmental factors unique to every city. Projections by the UNDESA that the urban population in the world will increase to 70% by 2050 should awaken urban planners to the demographical, environmental, economic, and socio-spatial challenges that lie ahead. In Riyadh's case, it is expected that its population will grow to 10 million by 2030. This projection necessitates the need for the cities in developing countries, such as Riyadh, to formulate urban policies that can provide guidance on how to surmount these challenges while exploiting the opportunities that will emerge from this demographic dividend. Buehler (2003) notes that the use of master planning or the technocratic model of urban planning may worsen the challenges of rapid urbanisation hence the need to adopt a participatory model of urban planning.

- *Access to public services and facilities*

One of the consequences of urbanisation – as it the case of Riyadh – is the access to public services and facilities. As evidenced by the results of the study, the most affected public services by the

increase in urban population include water and sanitation, health and housing. Bajaber (2017) notes that municipal authorities in the city found themselves grappling with challenges of providing residents equal access to public services and facilities owing to the increase in population. This is reminiscent of the situations in most cities in developing countries. Tacoli et al. (2015) attributes the decrease in the urban quality and poor provision of services to the increasing urbanisation rate in these cities. The strain on public infrastructures and services is payback towards the government for exhibiting urban bias by concentrating economic development in the urban centres at the expense of the rural areas. Furthermore, in many developing countries, agriculture – the main economic activity – has been subordinated by the governments thereby reducing its lucrativeness in the eyes of those living in the rural areas. In contrast to the urban areas, the distribution of public services and facilities, such as health and education are scarcely distributed in the rural areas, which inhibits the rural dwellers' access to health and educational services. This state of inequality among regions is a push factor for many rural migrants towards the urban centres, which are far superior in terms of the distribution of the public service facilities and services. Coupled with the natural population growth in the urban areas, the resultant population increase soon surpasses the availability of public facilities and services resulting in a strain on these infrastructures. This situation has played out in Riyadh particularly with regards to water availability; indeed, interviews with three categories of respondents identified water scarcity as an impact of rapid urbanisation insofar as public services are concerned. GAMEP (2017) also acknowledges that the increasing water consumption has worsened the water scarcity problem considering that the kingdom's water aquifer reserves are in danger of depletion. The strain on public services and facilities has also been manifested in the case of the road network in Riyadh, which has borne the brunt of traffic snarl-ups. Tacoli et al. (2015) reveal that this is a problem synonymous with many cities in developing countries in which the public infrastructures are inadequate to handle the increasing population.

10.3. Recommendations

10.3.1. Participatory Governance

To increase the level of public participation in urban planning and implementation, there is a need to move away from a technocratic model of urban planning in favour of a participatory governance model. There are various advantages of the latter model of urban planning compared to the technocratic model (Master Planning) of urban planning that has been predominantly applied by urban planning authorities not only in Riyadh but also in other areas of KSA. UNDP (2016) notes that participatory governance ensures transparency in the urban planning process and subsequent utilisation of the resources. It prevents the concentration of power into the hands of the elite who

may only be focused on making self-centred decisions at the expense of the city residents. This study recommends the application of information and communication technology (ICT) in enhancing participatory governance by providing a platform for as many city residents as possible with the chance to participate in sustainable urban planning and development by monitoring the different sustainable development projects. The use of ICT will provide increased opportunities for city residents to participate in the supervision and monitoring of sustainable development projects in addition to increasing the engagement between citizens and the local government (Al-Barrak et al. 2016). The use of ICT to increase citizen's participation in the sustainable urban planning process considering the high rate of Internet coverage in Riyadh owing to the expansive telecommunications network in the city.

This form of Internet-oriented participatory governance – known as e-participation – could occur in several ways including consultation; deliberation; petitioning; voting; information provision; spatial planning; and community building. Through ICT tools, local government in Riyadh and other urban planning authorities could obtain residents' feedback and opinions on various sustainable urban planning issues, which would then be factored into the sustainable urban planning process. Tools that could be utilised in this process include government websites, community chatrooms and social media; these tools enhance a two-way communication process that has been sorely lacking in the current urban planning process. These tools could also form a platform for deliberations among urban planning stakeholders on sustainable urbanisation issues that could be metamorphosed into a sustainable urban planning policy that takes into consideration the needs and concerns of the different stakeholders. It is an open discussion that involves the evaluation of the challenges or shortfalls of crucial policy issues insofar as sustainable urbanisation is concerned. Through ICT, the public will also be able to petition their local government authorities on various issues afflicting them. They will be able to garner support among themselves to enhance the chances of successfully petitioning the government to undertake action on the specific issues affecting them. For example, they could petition the government about the relocation of a landfill to curb environmental degradation. Electronic voting would be suitable for persons with physical disabilities who may not be able to physically avail themselves for voting on various policy issues. ICT would also enhance community building or social cohesion by allowing members of the public from the same area or region to join together on a common issue and to push for it.

In addition to adoption of ICT as a tool for enhancing participatory governance, this study proposes a greater involvement of the academia in the urban planning process. This proposal is informed by the finding that the academia has not been proactively involved in the urban planning process and

implementation but has been limited to providing recommendations and empirical evidence from various studies. There are several benefits to affording the academia – including research centres and universities – a greater stake in the sustainable urban planning and development process. Through their research, the academia can develop and improve other stakeholders' knowledge of various issues related to sustainable urbanisation in Riyadh. This empirical evidence could guide in the formulation of tailored solutions to cater for the issues identified as well as strategies to exploit the opportunities. UNHABITAT (2016) points out that research institutions and universities can play an integral role in shaping sustainable cities with regards to four main dimensions: communications, governance, credibility inaccessibility and resources). An example of an initiative through which the academia has contributed significantly to creation of sustainable cities is the University Network Initiative (UNI), which brings together UNHABITAT and various institutions of higher learning from around the global. Through this initiative, universities have been able to successfully engage with their respective governments in solving various problems/challenges related to urbanisation. Currently comprising 189 institutions of higher learning, only 16% of the members of UNI are from Arab states of Egypt and Algeria. The study therefore proposes that academia (researchers or universities) should consider enlisting as part of UNI to position themselves at a vantage point to engage with the central government and the local government on various issues insofar as sustainable urbanisation is concerned. According to UNHABITAT (2016), the engagement between UNI members and their respective governments focuses on the following streams: climate change; urban form; urban regeneration; urban futures; informal urbanism; urban accessibility; and food security.

Furthermore, the academia would be a useful partner in building the capacity of local urban planning officials insofar as sustainable urban planning is concerned. This is in light of the finding that many urban planning officials are not knowledgeable on the latest skills and hardware required for urban planning, such as GIS. Future Saudi Cities Programme (2016) further reports that there is an inadequate number of qualified engineers or urban planners within most municipal authorities. Urban planning as a career is not considered lucrative because of the poor remuneration and lack of progression up the career ladder. The role of the academia in this regard would be to provide courses that seek to impart the necessary skills for sustainable urban planning. On its part, the government has to make urban planning as lucrative as possible – specially to attract youthful graduates who are techno savvy – by improving remuneration and the work conditions. Employment of more urban planners would alleviate the work pressure on the current planners – especially within local governments – who have found themselves pre-occupied with resolving local land disputes at the expense of developing strategic plans. As a result, most of the strategic

plans have been prepared by foreign consultants (Future Saudi Cities Programme 2016). By improving on the remuneration and working conditions of urban planning as a career, the government would effectively drive more Saudi youth towards universities that offer courses on urban planning. At the universities, the academia should play its role by not only focusing on the technical aspects of the urban planning software but also on how to analyse and interpret the information gleaned from the use of such software.

10.3.2. Urban Planning Reforms

Following the challenges involving coordination of urban planning processes within the national and local government, this study proposes devolution and decentralisation as a form of urban planning reform. This reform entails devolving the responsibility of decision-making to sub-national urban planning stakeholders at the local, regional and metropolitan level. In comparison to the current urban planning system, this would entail taking away the decision-making responsibility from MOMRA. This decentralised/devolved framework of planning would enable dynamic growth at the local levels through the application of local knowledge and expertise that are responsive to the local needs. This is because the sub-national stakeholders have a greater understanding of the sub-national issues at their respective levels and hence are able to address these issues comprehensively in comparison to the stakeholders at the central/national government level. The process would further enhance horizontal participation for a great number of stakeholders at the local level including planning agencies, such as Arriyadh Development Authority (ADA). Under this proposed decentralisation/devolved framework of planning, sub-national stakeholders would be tasked with the responsibility of preparing strategic planning objectives, monitoring and evaluation of urban development projects as well as master planning activities. Such an enhanced role is only possible when the actors at the sub-national level are afforded greater autonomy in shaping the local development agenda unlike as is presently the case. Even amidst the autonomy afforded the actors at the sub-national level, structures would be developed to ensure that the plans developed at the sub-national levels comply with the NSS and national-level development policies, including Vision 2030 and NTP 2020. In this regard, the study proposes that MOMRA retains its role in monitoring and guidance of the regional plans.

The success of this urban reform requires increased funding to the sub-national level to foster the formulation of effective development structures. This would ensure that the sub-national levels are able to function independently from MOMRA and effectively as is expected to be the case with this urban planning reform. Future Saudi Cities Programme (2016) notes the challenge of a devolved system of urban planning is that the devolved units would not be able to function effectively outside of the control of MOMRA. Apart from the provision of funding, there is need

for legal resources (legal changes) and personnel to ensure that the governance structure becomes effective. Equally important for the success of this proposed reform is the need for transparency and accountability. The study proposes the development of a framework of accountability that includes a system of dialogue that ensures that the planning processes that occur at these lower levels do not occur in isolation but in compliance with the national-level development policies. This dialogue would involve the sharing of best practices or development information among the different administrations at the sub-national and national levels. The dialogue would also occur in an open forum, including regional/sub-regional assemblies where the different stakeholders would discuss their development priorities with one another. The study also proposes a transitional period for the urban planning reform during which the focus would be on enhancing the capacity of the stakeholders at the sub-national level on their functions. Such stakeholders would be primarily municipal authorities and officials of special planning agencies (in this case, ADA). The process of enhancing the capacity of the aforementioned actors at the sub-national level would be undertaken by MOMRA.

10.3.3. Public-Private Partnerships (PPPs)

This study proposes public-private sector partnerships (PPPs) between the local government in Riyadh and the private sector as a solution to various challenges that the city has been grappling with in regard to sustainable urbanisation, such as lack of affordable housing, poor waste management and strained public infrastructures. UN-HABITAT (2017) notes that private sector involvement in the provision of public services and urban infrastructure is necessary if sustainable cities are to become a reality. This is because the private sectors come with innovative approaches to spatial planning, which are often human-centred and ensure greater efficiency. Furthermore, private sectors help cover the budgetary deficits that municipal authorities may encounter in carrying out various urban development projects. PPPs will also help alleviate the unemployment challenge in Riyadh through creation of additional employment opportunities for the youth. As is the case with other cities that have adopted PPPs, this study envisages that private sector involvement in the urban planning and development process in Riyadh will be necessary in the various phases of the process, including policy formulation, planning, implementation, design, monitoring and evaluation, as well as operation and maintenance. To this end, PPP is part of participatory governance in which the private sector is an integral stakeholder that is involved in the deliberations either through formal engagements or informal consultations. A structured engagement between the public and the private sector must encompass other stakeholders in the urban planning process including the academia, business community, city residents and the civil society, among others. These engagements should ideally focus on how the conceived urban

development projects can drive Riyadh towards social, economic and environmental sustainability in addition to enhancing the quality of life for residents, social services, integrity, urban equity, trust, resilience, inclusiveness, cohesion and innovation.

Nonetheless, the success of PPPs is dependent on both parties fulfilling their obligations. On its part, the local government should engage the private sector at the earliest stage of the urban design process. The expertise of the private sector at this early stage would enlighten the local government of the risks involved in the implementation of the urban design as well as the economic ramifications involved. This study further proposes that the government should establish clear policies to enhance synergy between the current state of urbanisation in Riyadh, the national development plans of KSA and the stakeholders involved in urban planning. There is need for legal frameworks and regulations that enhance accountability, security, certainty, integrity, simplicity, predictability and enforcement insofar as sustainable urban development projects. All stakeholders of urban planning need to be involved in the process of formulating these legal frameworks to ensure that their needs and concerns are taken into consideration. Formulation of legal frameworks is necessary to counter the legal uncertainties and barriers that often affect many PPPs and hinder the progress of urban projects that are brainchildren of PPPs. The study further proposes that the local government should refine its procurement practices in favour of transparent and flexible ones. One of the shortfalls of KSA's procurement practices has been their rigidity or one-size-fits-all approach. Such practices may inhibit innovation while driving up the costs of the projects involved (UN-HABITAT 2017). An equally important role for the public sector/government to play in ensuring the success of PPPs is to oversee the establishment of a dispute resolution mechanism to enable peaceful resolution of disputes that may arise between the parties involved in the PPPs. UN-HABITAT (2017) notes that PPPs may become fraught with disputes owing to long-term contractual relationships as well as vested interests. An effective dispute resolution mechanism should be able to hear and resolve disputes in a timely and impartial manner without interference from the government. This will only materialise when the dispute resolution board is provided with adequate financial resources and capacity building. Essential ingredients for an effective dispute resolution system include binding and expert panels, mediators, national regulators and international arbitration or jurisdiction (non-binding).

On the part of the private sector, it should be a proactive in seeking out partnerships with the public sector/government at every opportunity. The private sector should proactively engage the government in dialogue regarding the innovative solutions that could harness the opportunities presented by urbanisation while countering the challenges arising from the same. Apart from direct engagement with the government, this study proposes that the private sector should also engage

the local communities at all stages of the sustainable urban planning and development process. This engagement should assume the form of a two-way communication in which the private sector provides the local community with information on various aspects of a sustainable urban project it is undertaking, such as its impacts, outcomes, interdependencies and payoffs. On the other hand, the local community should be afforded an opportunity to present its concerns and suggestions regarding the project. Engagement of the local community would thus ensure their buy-in to the projects. In addition to engagement with the local community, the study proposes collaborations between the private sector and the non-governmental organisations and academic/research institutions. These collaborations are an opportunity to test the social and environmentally viability or feasibility of the projects in relation to the needs and concerns of the local community, civil society and research institutions.

10.3.4. Modern Waste Management

Based on the challenges that Riyadh has encountered in the management of waste, this study recommends that the city should adopt waste-to-energy as a modern waste management strategy. This strategy would help transform the problem of the increasing municipal solid waste into an opportunity from which the local government can alleviate other challenges afflicting the residents of the city, such as lack of renewable energies and water scarcity. Anjum et al. (2016) note that the waste-to-energy approach has been adopted in various developed economies as a waste management strategy that has culminated in the conversion of approximately 130 million tons of waste into electricity and heat. The study proposes various methods of converting waste products into energy, including pyrolysis, anaerobic digestion, gasification, fermentation and incineration. Anaerobic digestion would be suited for harnessing energy from disposed foods, which are often high in organic content. On the other hand, pyrolysis would come in handy in converting plastic waste into liquid fuel and thus reduce the harmful effects of plastic waste to the environment. Anjum et al. (2016) point out that plastic waste is a huge issue for many municipal authorities in KSA considering that it constitutes the second largest component of municipal solid waste.

Anjum et al. (2016) define anaerobic digestion as the microbial stabilisation and degradation of organic waste to produce stable biomass and biogas. Apart from the economic benefits of this waste management strategy, it offers a safe way of waste management compared to other methods, such as landfills. The methane harnessed from anaerobic digestion can be utilised as renewable energy, which is affordable compared to the fossil fuels. Anjum et al. (2016) further notes that the anaerobic digestion process does not result in excessive greenhouse gases (GHG) emissions compared to the fossil fuels that are currently used as fuel in Riyadh and other parts of KSA. Anaerobic digestion occurs through various techniques, such as conversion of biogas into

methanol or biogas upgradation. The latter technique seeks to increase the calorific value of the biogas by removing carbon dioxide whereas conversion of biogas entails converting it into methanol, which is liquid methane. Nonetheless, the conversion of biogas into methanol might be a feasible and cost-effective strategy compared to biogas upgradation. Anjum et al. (2016) note that the resultant methane harnessed from biogas upgradation may be cumbersome to store and transport compared to methanol, which can be easily transported via tankers.

Anjum et al. (2016) describe pyrolysis as the use of tertiary recycling methods in the thermal conversion of plastic waste at temperatures ranging from 300° C and 900°C. The process produces vapor, which is then converted into liquid fuel through condensation; this liquid fuel could be used in place of the conventional diesel fuel (Anjum et al. 2016). Apart from the liquid fuel, pyrolysis also results in the production of char, which is an unburnt piece of plastic that can be used in wastewater treatment. In this regard, the use of char would help alleviate the water scarcity challenge in Riyadh and enable the authorities cope with the excessive water consumption in the city. Anjum et al. (2016) reveal that char is helpful in removing heavy metals from wastewater.

10.3.5. Improved water management

Curbing the water scarcity and excessive water consumption challenges in Riyadh requires a raft of improved water management strategies. This study proposes that the local government should adopt indirect potable reuse as a strategy for meeting the increased water consumption and demand in the city. According to Dube (2017), indirect potable reuse involves the discharge of treated wastewater into rivers, aquifers or lakes to enhance the degradation of contaminants before the wastewater can become safe for human consumption. It is a safer method of reusing water compared to direct potable use that involves the treatment of wastewater to a quality level that makes it fit for human consumption. Nonetheless, a demerit of direct potable reuse is that the treated wastewater may not be completely rid of the contaminants and thus may raise various health concerns. The adoption of water recycling and reuse as part of a water management strategy would create enough water resources for non-drinking use, such as maintenance of green spaces, agriculture, horticulture, and other environmental uses. Apart from increasing the proportion of water resources, water recycling and reuse can help improve the environment by reducing the amount of effluent deposited into the environment via untreated wastewater (DeNicola et al. 2015). Noteworthy is that the adoption of water recycling and reuse will require the central and the local government to improve in its sewage collection and treatment system. This is necessary to remove the many microbial contaminants that are often present in wastewater including pathogens, protozoa, heavy metals, viruses, pharmaceutical compounds, and helminths.

The study also proposes that Riyadh should adopt rainwater harvesting as a method for mitigating water shortage in the city. Nonetheless, just like water recycling and reuse, it is important that this strategy should be cognisant of the health concerns involved, such as microorganisms, pollutant particles, organic substances and heavy metals. DeNicola et al. (2015) also note that rainwater may be sources of organic substances and heavy metals owing to their catchment areas. Fortunately, there are inexpensive ways of treating rainwater, such as pasteurisation, chlorination and slow sand filtration. The study further proposes that the government should increase awareness among the public on rainwater harvesting and encourage city residents to harvest rainwater in their homes. The awareness campaigns should focus on the benefits of rainwater harvesting, methods of rainwater harvesting and how to treat rainwater harvesting. Shifting the responsibility of rainwater harvesting to the public can increase the public's awareness on their consumption habits and how the same is affecting the environment.

A third proposed strategy for improved water management strategy is for the central government to increase its supervision of water management. DeNicola et al. (2015) note that the government's low tariff structure of US$0.03/cubic meter has precipitated an increased consumption of water that averaged at 7 billion cubic meters as at 2015. A majority of this water is directed towards the flood irrigation of farmlands in KSA to mitigate the minimal rainfall that the kingdom receives. DeNicola et al. (2015) cite statistics from the Saudi Arabian Monetary Agency that reveal that over 80% of the water consumption is directed towards agricultural practices. Landowners have been given the leeway to draw water from the aquifers with minimal restrictions whereas the increasing population of Riyadh has increased the demand and subsequent consumption of water. The adoption of the aforementioned proposed water management strategies will go a long way in alleviating the pressure that is currently exerted on desalination plants to meet the demand for water resources. Despite being the world's largest producer of desalinated water, the amount of water produced via desalination plants is inadequate to meet the demand for water. This prompted the Saudi Water Conservation Council to increase production of desalinated water in 2015 from 1.2 billion cubic metres to approximately 1.8 billion cubic metres. Unfortunately, an increase in the production of desalinated water – as is expected in the future – will result in an increase in domestic oil consumption. DeNicola et al. (2015) warn that this would decrease the volume of KSA's oil exports and by extension, reduce its oil revenues. Moreover, it would mean an increase in the emission of GHGs through the emission of fossil fuels thereby affecting the air quality.

10.3.6. Adoption of green building technologies

The study proposes the adoption of green building technologies in the housing industry to make housing affordable, enhance privacy of Saudi families and reduce the use of renewable energy.

Green building technologies – also known as smart building technologies – will reduce the costs of constructing houses; costs that in most cases have been passed on by the private developers to the consumers. For the benefits of smart building technologies to be realised, it is vital for both the government and the private sector to fulfil certain obligations. This study proposes that the government should provide financial incentives or tax reliefs for construction companies that inculcate green building technologies into the construction of residential and commercial properties. Al-Surf et al. (2013) note that one of the impediments to the adoption of green building technologies in the Saudi construction industry has been the perceived costliness of sustainable building materials – e.g. water treatment systems, flush tanks and solar panels, among others – most of which have to be exported. Providing incentives and tax reliefs will encourage the construction companies to invest in smart building technologies in the comfort that the government will 'subsidise' the costs associated with purchasing these smart building technologies. Equally important are regulations that incorporate the principles of sustainable architecture in the Saudi construction industry. The government should conduct public awareness about the Saudi Building Code to enlighten the private sector (construction companies) and the public on the same and its link to sustainability. Although the use of green building technologies may be costly at the outset, the costs will eventually decline in lieu of the utilities, such as electricity and water.

Even as urban planning stakeholders deliberate on the integration of sustainability into various facets of urbanisation, it is important to be cognisant of the cultural and religious values of the city residents. One of the challenges that have emerged in the housing industry has been the invasion of the privacy of many families owing to the inculcation of Western principles of architecture at the expense of the Islamic principles. This study proposes that the government inculcate the Islamic principles of architectural designs in the regulations on sustainable buildings.

10.3.7. Empowerment of SMEs

The study proposes that the government needs to pay increased attention to small and medium enterprises (SMEs) by empowering them so that they can be an avenue through which the youth can employ themselves by applying their skills and knowledge. One of the impediments to the success of youth-owned SMEs has been their inability to access loans from commercial banks and other financial institutions for failure to meet the loan requirements of these institutions. Therefore, the government ought to mediate between the financial institutions and SME owners so that the former can develop loan products that are catered to the capabilities of the SMEs. This is informed by the fact that many financial institutions consider youth-owned SMEs as risky customers who may default on their loans and thus result in losses for the financial institutions. Another proposal in this regard is that the government should increase awareness of its Kafalah lending programme

so that more SMEs may access this financial service. Waked (2016) notes that many SMEs are unable to access this government funding programme because of lack of awareness and the minimal coverage of the programme. Thus, the government needs to increase the coverage of the programme by expanding it as much as possible in Riyadh and other areas of KSA.

Additionally, this study proposes that the local government – in conjunction with the relevant government ministries – should engineer entrepreneurship programmes for youth-owned SMEs. These programmes could assume the form of workshops, courses or consultancy sessions to enlighten the youth on how to handle the challenges associated with running SMEs. Such programmes will provide SME owners with entrepreneurship skills to steer their business through turbulent times and to develop business networks that are integral for the growth of their respective business. Successful empowerment of SMEs will help create additional job opportunities because successful SMEs will be able to absorb more Saudi youth who have been unsuccessful in securing employment in the public sector.

10.3.8. Improving Walkability

Even as the government grapples with the introduction of a public transport system to alleviate the traffic congestion problem, it needs to look at walkability as another way of reducing traffic congestion by reducing residents' dependence on private cars as the chief mode of transportation. This study proposes several strategies to improve walkability in Riyadh and encourage many more residents of Riyadh to adopt a walking culture. One of these strategies is to plant more trees along the streets to provide more shade and protection from solar radiation as far as pedestrians are concerned. This is in light of the fact that one of the hindrances to the adoption of a walking culture has been the harsh, arid climate of the city. The study also proposes that the government should increase residential and block densities to encourage more residents to walk. Ledraa (2015) reveals that areas with higher street density tend to encourage a walking culture because they provide more pathways to destinations. Also important is to introduce regulations to control the vehicle speed and increase the number of continuous sidewalks complete with adjoining facades. Encouraging a walking culture also entails constructing or locating public amenities and services within the walking distance of residents. This would entail that the local and central government increase the number of these services and amenities, which would equally go a long way in enhancing social and spatial equality in the city.

10.3.9. Discussions based on literature review and findings

One of the key theories related to sustainable urbanisation is the modernization theory. A brainchild of Max Weber, the Modernization theory notes that industrialisation leads to urbanisation thanks to the application of better methods of production. The growth of industries

acts as a pull factor for rural migrants – especially the youth – who troop to these urban centres in search of opportunities to improve their wellbeing. Indeed, the findings of the study indicate that one of the reasons or social factors responsible for the population growth in Riyadh has been the rural-urban migration. However, as Tipps (1973) notes, many urban centres especially in the developing countries have struggled to meet the population's swelling demand for health, education, infrastructure and housing. The rise in population has occasioned a challenge for urban planning authorities in Riyadh who have been unable to meet the residents' demand for necessities, such as housing, social services, employment opportunities, water and energy. Tipps' sentiments about the modernization theory are reflected in a key finding of the study that population growth is a major challenge in sustainable urban planning – in addition to being a barrier to sustainable urbanisation. Other studies on urbanisation in Riyadh have shown that increased population is responsible for several challenges, such as incessant traffic jams, increased consumption of water, increased municipal waste and inadequate employment opportunities. Another barrier to sustainable urbanisation is poor community participation according to the perception of most of the respondents of the study. This finding brings to mind previous studies that have highlighted lack of community involvement as an impediment to sustainable urbanisation. Al-Surf et al. (2010) note that most Saudi residents are unaware of what sustainable urbanisation entails. Similarly, Al-Ghamdi (2018) points out that there are low levels of awareness on sustainable urbanisation among university students in Saudi Arabia. According to study findings, environmental degradation is an impediment to sustainable urbanisation in the form of natural resource depletion, pollution and poor waste management/disposal. This finding is not exclusive to this study in light of previous research that have shed light on the negative impacts of urban sprawl. In her study, Muneerah (2015) reveals that the Wadi Hanifa valley has been degraded by many years of wastewater pollution occasioned by poor waste management. Seepage of sewerage into the ground has consequently culminated in the pollution of water aquifers, which are a major source of water supply in the city. Due to the growth of technology, GAMEP (2017) points out that municipal authorities have been grappling with the challenge of disposing of hazardous waste, such as medical and electronic waste.

A key finding from the study is that the political will among stakeholders is a driver of sustainable urbanisation. Al-Surf and Mostafa (2016) identify Saudi Vision 2030 and NTP 2020 as evidence that the political actors are committed to the realisation of sustainable urbanisation. Integration of sustainable urban development has also been enhanced by increasing the participation of female residents in the municipal affairs. As at 2012, women are allowed to participate in municipal elections by voting for their preferred leaders and standing for elective posts (MOMRA 2013).

This political will extends to the top levels of government where leaders, such as the Crown Prince have been at the forefront in enhancing local community participation in development projects. Part of the Saudi Vision 2030 is an ambitious roadmap that seeks to bring together local communities and government officials. One such meeting is the 2016 Saudi Urban Forum, which is roundtable consisting of MOMRA, AMANAHs, local communities and UNHABITAT. Poor urbanisation policies were identified as another challenge in planning for sustainable urban planning. Al-Surf et al. (2013) identifies the housing sector as one in need of policies or guidelines for the adoption of sustainable housing materials to achieve affordable housing for Riyadh residents.

10.3.10. Contribution to knowledge

This research contributes to the body of knowledge of sustainable urbanisation by providing empirical evidence of the challenges and opportunities inherent in desert cities, such as Riyadh. As the central government continues to position sustainability at the centre of its national development plans, the findings of this study provide robust guidance on the stumbling blocks that lie ahead as well as the enablers that may drive Riyadh as well as other KSA cities closer to realising the objective of sustainable cities.

Additionally, this research provides insight into how sustainable urbanisation can improve the quality of life for the city residents concerned. Sustainable urban development has three pillars, which are integral to its objective of adequately meeting the demands of the present generation without inhibiting the ability of the future generation to meet its needs. The three pillars include economic, social and environmental sustainability each of which comprise ideal situations that could arise out of the application of sustainability practices. Through interviews conducted with the respondents (residents, urban planning officials and academics/researchers), this study contributes to the body of knowledge about how the benefits of sustainable urbanisation would be realised in a desert city, such as Riyadh.

This study also enhances understanding on the effect of rapid urbanisation on desert or arid lands. As an arid area, Riyadh has experienced severe environmental challenges resulting from population growth, such as water scarcity, air pollution and natural resource depletion. It also contributes to the body of knowledge by providing evidence of the challenges that urban planning officials encounter in sustainable urban planning and implementation. From the perspective of the respondents, it highlights the ingredients required for sustainable urban development.

10.3.11. Recommendations for further research

Whereas this study explored the levels of public awareness on sustainable urbanisation among Riyadh residents – and established that there are low levels of public awareness – it only focused on the public awareness from a general perspective. Therefore, based on the findings of the study on public awareness, future studies should explore the gender differences in the level of public awareness on sustainable practices. Such studies could adopt a qualitative methodological approach using interviews to try and understand which of the two genders – Riyadh women or men – are more enlightened about the sustainable practices that are integral to sustainable urbanisation and sustainable cities. Future studies should also explore the demographic differences in the level of public awareness on sustainable practices. Such a study could seek to understand the age and socioeconomic differences among Riyadh residents with regards to the levels of awareness on sustainable practices that are integral to creating sustainable cities. The researcher also proposes that the study should be a longitudinal one in which the public awareness levels on sustainable urbanisation is examined over a period of time to establish whether the levels are increasing or not. The findings of the study would provide empirical evidence on whether efforts to increase public awareness are bearing fruit or better strategies are required to improve the awareness levels.

The researcher also proposes a comparative study of two or three KSA cities (e.g. Riyadh, Jeddah and Medina/Mecca) regarding the social, environmental, political, economic and physical factors influencing sustainable urbanisation. Considering that this study focused on Riyadh as far as the social, environmental, economic, physical and political factors of sustainable urbanisation is concerned, future studies could expand to the aforementioned desert cities to examine whether these cities experience similar challenges and opportunities as Riyadh.

10.4. Conclusion

Considering that the urban population of Riyadh is expected to increase, sustainability is an issue that will continue to feature in conversations about urbanisation and urban planning. The sustainable urbanisation process requires multi-stakeholder participation that brings together different perspectives on how sustainability can be integrated into future development projects. This study is a step towards the multi-stakeholder participation by identifying the perspectives of three kinds of stakeholders (Riyadh residents, urban planning officials and academics/researchers) regarding how to facilitate sustainable urbanisation in a desert city, such as Riyadh.

BIBLIOGRAPHY

Abdallah, MS 2017, *Water Pollution and Treatment of Wadi Hanifah (Hanifah Valley)*, King Fahd University of Petroleum & Minerals, Riyadh

Abdul Salam, A., Elsegaey, I., Khraif, R. & Al-Mutairi, A. (2014). Population Distribution and Household Conditions in Saudi Arabia: Reflections from the 2010 Census. Springerplus, Vol 3, No. 1, pp. 530-581.

Abdulaal, W.A. (2008). Municipal Councils in Saudi Arabia: Context and Organization. *Environmental Design Science, Vol.6*

Abdullahi, S and Pradhan, B 2017, *Sustainable Urban Development in Spatial Modeling and Assessment of Urban Form: Analysis of Urban Growth from Sprawl to Compact using Geospatial Data*, Springer International, Cham

Abou-Korin, A. & Al-Shihri, F., 2015. Rapid Urbanisation and Sustainability in Saudi Arabia: The Case of Dammam Metropolitan Area. Journal of Sustainable Development, 8(9), pp. 52-65.

Abusaaq, H.I. 2015, *Population Aging in Saudi Arabia*, Riyadh, Saudi Arabia Monetary Agency (SAMA)

Aina, Y.,Van der Merwe, J. H. & Al-Shuwaikhat, H., 2008. Urban spatial growth and land use change in Riyadh: comparing spectral angle mapping and band ratioing techniques. s.l., GISSA.

Al-Barrak, K. et al. (2016). *Towards a Model for Monitoring Public Services Projects in Saudi Arabia.* 10th European Conference on Information Systems Management (ECISM)

Al-Bassam, AM 2012, *Urbanisation and Migration in Saudi Arabia: The Case of Buraydah City*, University of Leicester, Leicester

Al-But'hie, I. & Saleh, M., 2002. Urban and industrial development planning as an approach for Saudi Arabia: the case study of Jubail and Yandu. Habitat International, 26(1), pp. 1-20.

Al-Ghamdi, A.S. (2002). Using Logistic Regression to Estimate the Influence of Accident Factors on Accident Severity. *Accident Analysis & Prevention, Vol. 34(6)*

Alghamdi, N 2018, *Knowledge and Awareness of Sustainability in Saudi Arabian Public Universities*, Springer International Publishing, Cham, Switzerland

Al-Hathloul, S 2017, Riyadh Development Plans in the Past Fifty Years (1976-2016), *Current Urban Studies, Vol. 5*

Al-Hathloul, S.& Edadan, S. (1995), Housing Needs and Housing Development Strategies, Urban Development in Saudi Arabia: Challenges and Opportunities, pp. 157-177.

Al-Hathloul, S., 2004. Planning in the Middle East, moving toward the future. Habitat International, 28(4), pp. 641-643.

Al-Hathoul, S., & Mughal. M. A. (2004), RBAN Growth Management: The Saudi Experience, Habitual International, Vol. 28, No. 4, pp. 609-624.

Alhawas, A. (2011). Towards Sustainable Water Resources for Arid Land Cities: The Case of Riyadh, Water Resources Management, Vol 145, pp. 87-109.

Alhowaish, AK et al. 2018, Regional Inequalities and Public-Private Dynamics in Saudi Healthcare Provision, *Global Scientific Journals, Vol. 6(1)*

Allen, A. 2009, Sustainable cities or sustainable urbanisation. *Palette UCL's journal of sustainable cities, 1(2).* Retrieved <https://mycourses.aalto.fi/pluginfile.php/219334/mod_resource/content/1/sustainable_urbanisation_allen.pdf> [Accessed 20th May 2017]

Alkedheiri, A.A., 2002. The Role of Secondary Cities in the National Development Process of Saudi Arabia, Riyadh: Deputy Ministry of Urban Planning.

Al-Khateeb, L. (2015). *Saudi Arabia's Economic Time Bomb*. Retrieved <https://www.brookings.edu/opinions/saudi-arabias-economic-time-bomb/> [Accessed 20th May 2018]

Alkhathlan, K and Muhammad, Javid 2016, Carbon Emissions and Oil Consumption in Saudi Arabia, *Renewable and Sustainable Energy Reviews, Vol. 48*

Al-Kibsi, G et al. 2015, *Saudi Arabia beyond Oil: The Investment and Productivity Transformation*, McKinsey and Company, Riyadh

Almayouf, A 2013, Preserving the Green in Hot-arid Desert Environments: The Case of Riyadh, Saudi Arabia, *Architecture and Planning, Vol. 25(1)*

Almayouf, A. (2013). Preserving the Green in Hot-arid Desert Environments: The Case of Riyadh, Saudi Arabia. *Architecture and Planning, Vol. 25(1)*

Al-Mulali, U., Fereidouni, H., Lee, J. Y. M. & Sab, C., 2013. Exploring the relationship between urbanisation, energy consumption, and CO2 emission in MENA countries. Renewable and Sustainable Energy Reviews, pp. 107-112.

Alotaibi, O.M. (2017). *Potential Demand for Public Transport in Riyadh City, Saudi Arabia*. Cardiff: Cardiff University

Alotaibi, OM 2017, *Potential Demand for Public Transport in Riyadh City, Saudi Arabia*, Cardiff University, Cardiff

Al-Othmany, D., Hussain, A. & Banoqitah, E. (2013). High-Level Radioactive Waste Storage Feasibility for the Kingdom of Saudi Arabia, Arabian Journal for Science and Engineering, Vol 40, No. 1, pp. 195-203.

AlQahtany, A., Rezgui, Y. & Li, H., 2014. A Consensus-Based Framework for the Sustainable Urban Planning Development: 'As an Approach for Saudi Arabian Cities'. International Journal of Environmental Science and Development, 5(2), pp. 124-131.

Alqahtany, A.et al. (2014). A Consensus-Based Framework for the Sustainable Urban Planning Development: "As an Approach for Saudi Arabian Cities". *International Journal of Environmental Science and Development, Vol. 5(2)*

Al-Said Fahad, (2003). The Saudi Contemporary Neigbourhood: Al-Malaz, 39th ISoCaRP Congress, pp.4.

Alsaleh, S.A. (2012). *Gender Inequality in Saudi Arabia: Myth and Reality*. King Saud bin Abdulhaziz: Riyadh

Al-Saud, A 2018, The Development of Saudi Arabia in King Fahd's Era, *Asian Culture and History, Vol. 10(1)*

Al-Sayyad, AS and Nawar, AH 2017, *The Social Dimensions of Saudi Vision 2030: A Paradigm Shift*, International Policy Centre for Inclusive Growth (IPCIG), Brasilia

Alshammari, T 2011, Urban Sprawl of Cities in the Desert: A Comparison of Tucson, Arizona and Riyadh, Saudi Arabia. Indiana: Ball State University

Al-Sharif, N 2013, *Planning for the Unplanned: A Case Study of Slum Settlements in Jeddah*, Ball State University, Indiana

Alshehry, A.S. (2015). Economic Growth and Environmental Degradation in Saudi Arabia. *Journal of Economics and Sustainable Development, Vol. 6(2)*

Al-Shihri, F. & Benson, J. F., 2004. The National-local policy vacuum in sustainable land use planning: Al-Qatif Oasis, Saudi Arabia. Human Settlement Development, Volume 4.

Al-Shihri, FS, 2013. Principles of Sustainable Development and Their Application in Urban Planning in Saudi Arabia. Journal of Engineering Sciences, 41(3), pp. 1-25.

Alshuaibi, A 2017, Technology as an Important Role in the Implementation in Saudi Arabia's Vision 2030, *International Journal of Business, Humanities and Technology, Vol. 7(2)*

Al-Shuwaikhat, H. B. & Aina, Y., 2005. Sustainable planning: the need for strategic environmental assessment-based municipal planning in Saudi Arabia. Journal of Environmental Assessment Policy and Management, 7(3), p. 387.

Al-Shuwaikhat, H., Aina, Y. & Rahman, S., 2006. Integration of urban growth management and strategic assessment to ensure sustainable urban development: the case of Arab Gulf cities. International Journal of Sustainable Development and Planning, 1(2), pp. 203-213.

Alshuwaikhat, H.M. and Aina, Y.A., (2005). Sustainable Cities: Implementation of

Al-Surf, M., Trigunarsyah, B. & Susilwati, C., 2013. Saudi Arabia's sustainable housing limitations: the experts' views. Smart and Sustainable Built Environment, 2(3), pp. 251-271.

Al-Surf, M.S. and Lobna, Mostafa. (2016). Will the Saudi's 2030 Vision Raise the Public Awareness of Sustainable Practices? *Procedia Environmental Sciences, Vol. 37*

Al-Surf, M.S. et al. (2013). Saudi Arabia's Sustainable Housing Limitations: The Experts Views. *Smart and Sustainable Built Environment, Vol. 2(3)*

Althabt, A.A. (2013). *The Role of Regional Development Policies in Local Economic Development: The Case of Arriyadh, Saudi Arabia*, Newcastle University, Newcastle

Al-Thukair, A.A. (2009). *A Case Study on the Impact of Coastal Development along the East Coast of Saudi Arabia.* Dhahran: King Fahd University of Petroleum and Minerals

Al-Twaijry, A., Brierley, J. & William, D. (2003). The Development of Internal Audit in Saudi Arabia: An Institutional Theory Perspective, Critical Perspectives on Accounting, Vol 14, No. 5, pp. 507-531.

Alweis, R.L., Fitzpatrick, C. & Donato, A. A. (2015). Rater Perceptions of Bias Using the Multiple Mini-Interview Format: A Qualitative Study, Journal of Education and Training Studies, vol. 3, no. 5, pp. 52-58.

Alyahmad, H.H, & Saleh, S.S. 2013, Using Nvivo for Data Analysis in Qualitative Research, *International Interdisciplinary Journal of Education, 181*

Al-Yami, A.M. and AD, Price. (2006). *An Overview of Sustainability in Saudi Arabia*. Loughborough University: Leicestershire

Alyemeni, MN and Ibrahem, Almohisen 2013, Traffic and Industrial Activities around Riyadh Cause the Accumulation of Heavy Metals in Legumes: A Case Study, *Saudi Journal of Biological Sciences, Vol. 21*

Anderson, C 2010, Presenting and Evaluating Qualitative Research, *American Journal of Pharmaceutical Education, Vol. 74(8)*

Anjum, M. et al. (2016). Solid Waste Management in Saudi Arabia: A Review. *Journal of the Science of Food and Agriculture, Vol. 1(1)*

Antrop, M. (2006). Sustainable Landscapes: Contradiction, Fiction or Utopia? Landscape and Urban Planning, Vol 75, No. 3, pp. 187-197.

ARAMCO 2017, *Going against the Grain on the Abqhaiq-Dharran Highway*, Dimensions International, Dubai

Arcadis 2016, *Sustainable Cities Index 2016: A Focus on the Middle East*, Arcadis, London

Arriyadh Development Authority – ADA 2010, *Metropolitan Development Strategy for Arriyadh (MEDSTAR): The Comprehensive Summary Report*, ADA, Riyadh

Arriyadh Development Authority – ADA. (2015). *Investment in Arriyadh: Global Prospects Report 2014-2015*, ADA, Riyadh

Arriyadh Development Authority – ADA. (2010). *Metropolitan Development Strategy for Arriyadh (MEDSTAR): The Comprehensive Summary Report*. Riyadh: ADA

Arriyadh Development Authority. (1987), Demographic Transportation, Land Use, and Economic Studies for the City of Riyadh, Technical Report.

Asheim, G., Buccholz, W. & Tungodden, B., 2001. Justifying Sustainability. Journal of Environmental Economics and Management, Volume 41, pp. 252-268.

Asif, K., 2015. Planning for smart cities and environmental sustainability, Sydney: University of Sydney.

Bailey, L. F. (2014). The origin and success of qualitative research, International Journal of Market Research, 56, 2, pp. 167-184, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Bajaber, B 2017, Unbalanced Saudi Arabia, *Agora Journal of Urban Planning and Design, Vol. 40*

Baker, L. et al., 2002. Urbanisation and Warming of Phoenix (Arizona, USA): impacts, feedbacks and mitigation. Urban Ecosystems, Volume 6, pp. 183-203.

Baker, L., Brazel, T. & Westerhoff, P., 2004. Environmental consequences of rapid urbanisation in warm, arid lands: case study of Phoenix, Arizona. Sienna, Sienna Conference.

Bao, C. & He, D., 2015. The causal relationship between urbanisation, economic growth, and water use change in provincial china. Sustainability, 7(12), pp. 16076-16085.

Barau, A., 2010. Islamic instruments for sustainable urban spatial planning and management. Sustainable Architecture and Urban Developemnt, pp. 355-371.

Barichievy, C et al. 2018, Conservation in Saudi Arabia: Moving from Strategy to Practice, *Saudi Journal of Biological Sciences, Vol. 25*

Barnham, C. (2015). Quantitative and qualitative research, International Journal Of Market Research, 57, 6, pp. 837-854, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Belloumi, M., & Al-Shery, A.S. (2016). The impact of urbanisation on energy intensity in Saudi Arabia. Sustainability. 8(4) pp. 375.

Benna U. et al 2016, *Population Growth and Rapid Urbanisation in the Developing World,* IGI Global, Pennsylvania

Bidgood, A et al. 2017, *Urban Land Management for Sustainable Development in Riyadh, KSA,* World Bank, Washington D.C

Biernacki, P and Waldorf, D 1981, Snowball Sampling: Problems and Techniques of Chain Referral Sampling, *Sociological Methods and Research, Vol. 10(2)*

Bobbins, K. 2015. Promoting urban sustainability through managing ecological systems. Dialogues in Urbanisation. Eds. J. Condie and A.M. Cooper. Sydney: University of Sydney. 32-35.

Bokhari, AAH 2017, Human Capital Investment and Economic Growth in Saudi Arabia: Error Correction Model, *International Journal of Economics and Financial Issues, Vol. 7(4)*

Boslaugh, S. 2007, *Secondary Data Sources for Public Health: A Practical Guide (Practical Guides to Biostatistics and Epidemiology)*, Cambridge University Press, Cambridge

Bowles, P. & Sharman, S. (2014). A Review of the Impact of Different Types of Leading Interview Questions on Child and Adult Witnesses with Intellectual Disabilities, Psychiatry, Psychology & Law, 21, 2, pp. 205-217, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

Boyce C and Neale P, 2006, *Conducting In-Depth Interviews: A Guide for Conducting In-Depth Interviews for Evaluation Input*, Watertown

Boyko, C.T., Cooper, R., Davey, C.L., & Wotton, A.B. 2006. Addressing sustainability in the urban design process. An International Journal, 17.6: pp. 689-706.

Bradshaw, YW 1987, Urbanization and Underdevelopment: A Global Study of Modernization, Urban Bias and Economic Dependency, *American Sociological Review, Vol. 52*

Brady, S. R. (2015). Utilizing and Adapting the Delphi Method for Use in Qualitative Research, International Journal of Qualitative Methods, vol. 14, no. 5, pp. 1-6. Available from: 10.1177/1609406915621381. [31 January 2016].

Brenner, N 2009, What is Critical Urban Theory? *City, Vol. 13(3)*

Brubacher, S., Powell, M., Skouteris, H. & Guadagno, B. (2014). An Investigation of the Question-Types Teachers Use to Elicit Information from Children, Australian Educational and Developmental Psychologist, 31, 2, pp. 125-140, ERIC, EBSCOhost, viewed 31 January 2016.

Brundiers, K., Wiek, A., & Redman, C. (2010). Real-word learning opportunities in sustainability: from classroom to the real world. International Journal of Sustainability in Higher Education. 11(4) pp. 308-324.

Brundtland, H 1987, *Our Common Future: Report of the World Commission on Environment and Development*, Oxford University Press, Oxford

Buehler, R 2003, *Urban Development in Mega-Cities in Developing Countries: Potentials of Citizen Participation in Planning and Managing Urban Development*, University of Konstanz, Konstanz

Bulkeley, H. & Betsill, M. (2005). Rethinking Sustainable Cities: Multilevel Governance and the 'Urban' Politics of Climate Change, Environmental Politics, Vol 14, No. 1, pp. 42-63.

Burton, P. (1997). Urban policy and the myth of progress. Policy & Politics. 25(4) pp. 421-436.

Cetin, M. (2010). Trends of the Transformation of Urban Form in Arab Cities with Specific Reference to Al-Khobar. Journal of Civil Engineering and Architecture.4 (10). p.pp. 51–57.

Chen, J. (2007). Rapid Urbanisation in China: A Real Challenge to Soil Protection and Food Security, Catena, Vol 69, No. 1, pp. 1-15.

Choguill, C.L. (2008). Assessing the Urban Sustainability of Riyadh. *Architecture and Planning, Vol. 20(2)*

Creswell, JW 1998, *Qualitative Inquiry and Research Design: Choosing among Five Traditions*, Sage Publications, Thousand Oaks

DeNicola, E et al. 2015, Climate Change and Water Scarcity: The Case of Saudi Arabia, *Annals of Global Health, Vol. 81(3)*

Dorch, BF 2015, Open, Transparent and Honest – The Way We Practice Research, *Nordic Perspectives on Open Science, vol. 1*

Doumato, E.A. (2010). *Women Rights in the Middle East and North Africa: Saudi Arabia.* New York: Freedom House

Doxiadis 1968, *Riyadh Master Plan, Report No. A-1 to A-35,* Athens, Doxiadis Associates

Dube, P 2017, Saudi Vision 2030: Moving Towards Optimal Water Use, *World Water, Vol. 40 (6)*

Duh, J. Der, Shandas, V., Chang, H. & George, L.A. (2008). Rates of urbanisation and the resiliency of air and water quality. Science of the Total Environment. 400 (1-3). p.pp. 238–256.

El Menshawy, A., Aly, S.S. & Salman, A.M. (2011). Sustainable upgrading of informal settlements in the developing world, case study: Ezzbet Abd El Meniem Riyadh, Alexandria, Egypt. Procedia Engineering. 21. p.pp. 168–177.

El-Batran, M. (2008). “Urbanization”, in Tolba, M.K. and Saab, N. (Eds), Arab Environment;

El-Hames, A. (2012) 'Reconstruction of Flood Characteristics in Urbanised Arid Regions: Case Study of the Flood of 25 November 2009 in Jeddah, Saudi Arabia', Hydrological Sciences Journal, Vol 57, No. 3, pp. 507-516.

Ellis, A., West, B., Ryan, A. & DeShon, R. (2002). The Use of Impression Management Tactics in Structured Interviews: A Function of Question Type? Journal of Applied Psychology, 87, 6, pp. 1200-1208, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Enserink, B. & Koppenjan, J. (2007). Public participation in China: sustainable urbanisation and governance. Management of Environmental Quality: An International Journal. 18 (4). p.pp. 459–474.

Environmental Planning and Management, 47(2), pp. 303-311

Ferrara, R. 2015. The smart city and the green economy in Europe: a critical approach. Energies 8: 4724-4734.

Foran, B. et al. (2014). *Saudi Arabia: Balancing the G20's Global Impact*. Sydney: Institute for Land, Water and Society

Freire, M 2006, *Urban Planning: Challenges in Developing Countries*, International Congress on Human Development, Madrid

Freire, M.E., Lall, S. & Leipziger, D. (2014). Africa's Urbanisation: Challenges and Opportunities. Working Paper Number 7. p.pp. 1–27.

Future Challenges, The Arab Forum for Environmental Design, Beirut, pp. 32-44.

Future Saudi Cities Programme 2016, *Urban Planning Reviews*, UNHABITAT, Nairobi.

Gamboa, J. 2008. City Expanding to The Desert Horizon: Riyadh's problem of explosive growth and urban sprawl. Available at jpgamboa.comariyadhsprawl.pdf.

GAMEP – General Authority for Meteorology and Environmental Protection. (2017). *The State of the Environment (2017): Responsibilities and Achievements*. Riyadh: GAMEP.

Garba, SB 2004, *Managing Urban Growth and Development in the Riyadh Metropolitan Area, Saudi Arabia*, Habitat International, Vol 28(4), pp. 593-608.

García, B. (2004). Cultural Policy and Urban Regeneration in Western European Cities: Lessons from Experience, Prospects for the Future, Local Economy, Vol 19, No. 4, pp. 312-326.

Gaziulusoy, I. 2015. Role of design in sustainability and low-carbon emission cities. Dialogies in Sustainability. Eds. J. Condie and A.M. Cooper. Sydney: University of Sydney. 243-247.

General Authority for Statistics 2016, *Demographic Survey 2016*, Riyadh, General Authority for Statistics

General Authority on Statistics 2018, *Population by Gender, Age Group and Nationality (Saudis/Non-Saudi)*, accessed 5th October 2018 < https://www.stats.gov.sa/en/5680 >

Glasze, G. & Alkhayyal, A. (2002). Gated Housing Estates in The Arab World: Case Studies in Lebanon and Riyadh, Saudi Arabia, Environment and Planning, Vol 29, No. 3, pp. 321-336.

Global Mass Transit. (2011). *Policy Review: Public Transport in Saudi Arabia: Embracing Comprehensive Mobility*. Retrieved <https://www.globalmasstransit.net/archive.php?id=6463> [Accessed 28th May 2018]

Gober, P. (2010). Desert urbanisation and the challenges of water sustainability. Current Opinion in Environmental Sustainability. pp. 144–150.

Goodman, J., Gary, M. & Wood, R. (2014), Bibliographic Search Training for Evidence-Based Management Education: A Review of Relevant Literatures, Academy of Management Learning & Education, 13, 3, pp. 322-353, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Green, H. E. (2014), Use of theoretical and conceptual frameworks in qualitative research, Nurse Researcher, 21, 6, pp. 34-38, Medline, EBSCOhost, viewed 31 January 2016.

Groat, L. & Wang, D. (2013). Architectural Research Methods. London, UK: John Wiley & Sons, Inc.

Haapio, A. (2012). Towards sustainable urban communities. Environmental Impact Assessment Review. 32 (1). p.pp. 165–169.

Hajjar, N.T.B. (2014). *Energy and Environment in Saudi Arabia: Concerns and Opportunities.* Zurich: Springer International Publishing Switzerland, Zurich

Hall, P 1982, Enterprise Zones: A Justification, *International Journal of Urban and Regional Research, Vol. 6(3)*

Hall, P. (2003). The sustainable city in an age of globalisation. In Luigi Fusco Girard (ed.). The Human Sustainable City. Aldershot: Ashgate. pp. 55-69.

Hamdan, A 2005, Women and Education in Saudi Arabia: Challenges and Achievements, *International Education Journal, Vol. 6(1)*

Hannes, K., & Macaitis, K. (2012). A move to more systematic and transparent approaches in qualitative evidence synthesis: update on a review of published papers, Qualitative

Research, 12, 4, p. 402, Publisher Provided Full Text Searching File, EBSCOhost, viewed 31 January 2016

Hannes, K., Heyvaert, M., Slegers, K., Vandenbrande, S. & Van Nuland, M. (2015). Exploring the Potential for a Consolidated Standard for Reporting Guidelines for Qualitative Research: An Argument Delphi Approach, International Journal of Qualitative Methods, 14, 4, pp. 1-16, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

Hardoy, J. & Satterthwaite, D., 1989. Squatter Citizen: Life in the Urban Third World. 1st ed. London, UK: Earthscan.

Haregewoin, B 2005, *Urbanization and Urban Sprawl*, Stockholm: Master of Science Thesis

Harvey, D 1973, *Social Justice and the City*, Blackwell Publishers, Oxford

Hassan, A.M. & Lee, H. (2015). Toward the sustainable development of urban areas: An overview of global trends in trials and policies. Land Use Policy. 48. p.pp. 199–212.

Hayes, S. D. (1980). Riyadh on the Move, Aramco World, Vol. 31, No. 4, pp. 26-33.

HOK - Hellmuth, Obata + Kassabaum Architects. (2013). *Sustainable Planning Guidelines for Urban Growth in the Kingdom of Saudi Arabia*. Riyadh: HOK

Houghton, G. (1999). Environmental justice and the sustainable city. Journal of Planning Educaiton and Research. 18(3) pp. 233-243.

Hu, Y., Guo, D., Wang, M., Zhang, X., & Wang, S. (2015). The relationship between energy consumption and economic growth: evidence from China industrial sectors. Energies. 8(9) pp. 9392-9406.

Husain, T and Ahmed, Khalil 2013, Environment and Sustainable Development in the Kingdom of Saudi Arabia: Current Status and Future Strategy, *Journal of Sustainable Development, Vol. 6(12)*

Hussein, M.T. (2001). Groundwater Rights and Legislation for Sustainable Development in Arid Regions: The Case of Saudi Arabia. International Journal of Water Resources Development. 17 (2). p.pp. 227–235.

Ishcomer, BA 2009, *Red Fields to Green Fields: Transforming a Desert City*, City of Phoenix, Phoenix

Jessop, B. (2002). Liberalism, Neo-Liberalism and Urban Governance: a State Theoretical Perspective, Antipode, Vol 34, No. 3, pp. 452-472.

Jiang, L., Wu, F., Liu, Y., & Deng, X. (2014). Modeling the impacts of urbanisation and industrialisation transformation on water resources in China: an integrated hydro-economic GCE analysis. Sustainability. 6(11) pp. 7586-7600.

JLL – Jones Lang Lassalle. (2017). *Riyadh Real Estate Market Overview: 2015-2017*. Riyadh: JLL

Jørgensen, C. R. (2015). Three Advantages of Cross-National Comparative Ethnography--Methodological Reflections from a Study of Migrants and Minority Ethnic Youth in English and Spanish Schools, Ethnography and Education, 10, 1, pp. 1-16, ERIC, EBSCOhost, viewed 31 January 2016.

Kai-Wen, C. (2014). A Study on Applying Focus Group Interview on Education, Reading Improvement, vol. 51, no. 4, pp. 381-384

Kamel, M.A.E. (2013). Encouraging Walkability in GCC Cities: Smart Urban Solutions. *Smart and Sustainable Built Environment, Vol. 2(3)*

Kasarda, JD and Crenshaw, EM 1991, Third World Urbanisation: Dimensions, Theories and Determinants, *Annual Review of Sociology, Vol. 17*

Kawabata, M. & Gastaldo, D. (2015) The Less Said, the Better: Interpreting Silence in Qualitative Research, International Journal of Qualitative Methods, 14, 4, pp. 1-9, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

Kenny, J.F., Barber, N.L., Hutson, S.S., Linsey, K.S., Lovelace, J.K., & Maupin, M.A. (2009). Estimated use of water in the United States in 2005: U.S. geological survey circular 1344. Reston, VA: U.S. Geological Survey.

Kiefer, B 2015, *In Saudi Arabia, Social Media Prompts Culture Change*. accessed 17th May 2018<https://www.campaignlive.co.uk/article/saudi-arabia-social-media-prompts-culture-change/1349552>

Kiefer, B. (2015). *In Saudi Arabia, Social Media Prompts Culture Change*. Retrieved <https://www.campaignlive.co.uk/article/saudi-arabia-social-media-prompts-culture-change/1349552> [Accessed 29th May 2018]

Kithiia, J. (2010). Old Notion–New Relevance: Setting the Stage for the Use of Social Capital Resource in Adapting East African Coastal Cities to Climate Change, International Journal of Urban Sustainable Development, Vol 1, No. 2, pp. 17-32.

Knight Frank 2014, *Riyadh Residential Research Report,* Knight Frank, Dubai

Komiyama, H., & Takeuchi, K. (2006). Sustainability science: building a new discipline. Sustainability Science 1(1) pp. 1-6.

Kragelund, L., Moser, A. & van Zadelhoff, E. (2015). 'Using the Obser-View in Qualitative Research: Benefits and Challenges', International Journal of Qualitative Methods, 14, 5, pp. 1-9, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

Lau, A. (2012). Masdar city: a model of urban environmetal sustainability. Social Sciences. pp. 77-82.

Ledraa, T.A. (2015). Evaluating Walkability at the Neighbourhood and Street Levels in Riyadh Using GIS and Environment Audit Tools. *Emirates Journal for Engineering Research, Vol. 20(2)*

Lester S, 1999, *An Introduction to Phenomenological Research*, Stan Lester Developments, Taunton

Leung L, 2015, Validity, Reliability and Generalizability in Qualitative Research, *Journal of Family Medicine and Primary Care, Vol. 4(3)*

Li, S., & Ma, Y. (2014). Urbanisation, economic development and evironmental change. Sustainability. 6(8) pp. 5143-5161.

Li, S., Zhang, J., & Ma, Y. (2015). Financial development, environmental quality, and economic growth. Sustainability. 7(7) pp. 9395-9416.

Ligeti, E. & Penney, J., 2007. Cities Preparing for Climate Change: A Study of Six Urban Regions. 1st ed. Toronto: Clean Air Partnerships.

Lim, L.L.Y., Kjellstrom, T., Sleigh, A., Khamman, S., Seubsman, S., Dixon, J., & Banwell, C. (2009). Associations between urbanisation and components of the health-risk transition in Thailand: a descrptive study of 87,000 Thai adults. Global Health Action. 2.

Lin, J and Yang, A 2006, Does the Compact-city Paradigm Foster Sustainability? An Empirical Study in Taiwan, *Environment and Planning B: Planning and Design, 33(3)*

Lincoln, Y.S. and Guba, E.G 1985, *Naturalistic Inquiry*, Newbury Park, CA, Sage Publishers

Looney, R. (2004). Development Strategies for Saudi Arabia: Escaping the Rentier State Syndrome. *Strategic Insights Journal*

Lub, V. (2015). Validity in Qualitative Evaluation: Linking Purposes, Paradigms, and Perspectives, International Journal of Qualitative Methods, 14, 5, pp. 1-8, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

MacDonald, G.M. (2010). Water, climate change, and sustainability in the West. Proceedings of the National Academy of Sciences of the United States of America. 107(50) pp. 21256-21262.

Mahjabeen, Z et al. 2009, Rethinking Community Participation in Urban Planning: The Role of Disadvantaged Groups in Sydney Metropolitan Strategy, *Australasian Journal of Regional Studies, Vol. 15(1)*

Mandel, J. E. (1974). A Strategy for Selecting and Phrasing Questions in an Interview', Journal of Business Communication, 12, 1, pp. 17-23, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Mandeli, K.N. (2008). The realities of integrating physical planning and local management into urban development: A case study of Jeddah, Saudi Arabia. Habitat International. 32 (4). p.pp. 512–533.

Mansour, S 2016, Spatial Analysis of Public Health Facilities in Riyadh Governorate, Saudi Arabia: A GIS-Based Study to Assess Geographic Variations of Service Provision and Accessibility, *Geospatial Information Science, Vol. 19(1)*

Martin, C. A. 2008. Landscape Sustainability in a Sonoran Desert City. Cities and the Environment, 1(2): 1-16.

Martin, C.A. (2008). Landscape sustainability in a Sonoran Desert city. Cities and the Environment. 1(2) pp. 1-16.

McCullough, D.G. 2014. Saudi Arabia’s green decree brings hopes of sustainability. The Guardian. [Online] (Updated 12 May 2014) Available at: http://www.theguardian.com/sustainable-business/saudi-arabia-green-construction-oil-sustainability-environment [Accessed 4 February 2016].

McGranahan, G and Satterthwaite, D 2014, *Urbanisation Concepts and Trends*, IIED Working Paper, London

McMichael, A. (2000). The Urban Environment and Health in a World of Increasing Globalisation: Issues for Developing Countries, Bulletin of the World Health Organisation, Vol 78, No. 9, pp. 1117-1126.

Meyer, WB 2000, The Other Burgess Model, *Journal of Urban Geography, Vol. 21(3)*

Miller, H 2014, What are the Features of Urbanisation and Cities that Promote Productivity, Employment and Salaries, EPS Peaks, London

MOMRA – Ministry of Municipal and Rural Affairs 2013, *The National Report for the Third UN Conference on Housing and Sustainable Urban Development (HABITAT III) for the Kingdom of Saudi Arabia*, MOMRA, Riyadh

Montgomery, M., Stren, R., Cohen, B., & Reed, H. (2004). Cities transformed: demographic change and its implication in the developing world. London: Earthscan.

Mubarak, F.A. 2004. Urban growth boundary policy and residential suburbanisation: Riyadh, Saudi Arabia. Habitat International, 28.4: pp. 567-591.

Muller, A. & Mitlin, D., 2007. Securing inclusion: strategies for community empowerment and state redistribution. Environment and urbanisation, 19(2), pp. 425-439.

Muneerah, A 2015, *The Craving Desert: Story of a Remediated Dump, Wadi Hanifa,* Arriyadh Development Authority (ADA), Riyadh

Murphy, C 2012, *A Kingdom's Future: Saudi Arabia through the Eyes of its Twentysomethings*, Wilson Center, Pennsylvania

Muzondi, L. (2014). Urban Development Planning for Sustainability: urbanisation and Informal Settlements in a Democratic South Africa. Mediterranean Journal of Social Sciences. 5 (14). p.pp. 641–648.

National Industrial Cluster Program 2017, *Human Capital,* accessed 23rd November 2018 <https://www.ic.gov.sa/en/invest-in-saudi-arabia/human-capital/>

Newman, P and Kenworthy, J 1999, Sustainability and Cities: Overcoming Automobile Dependence, Island Press. Washington D.C.

Newman, P. 2006. The environmental impact of cities. Urban Studies, 18.2: pp. 275-295.

Nicholls, R. J., 2004. Coastal flooding and wetland loss in the 21st century: changes under the SRES climate and socio-economic scenarios. Global Environmental Change, 14(1), pp. 69-86.

Nicholls, R. J., 2004. Coastal flooding and wetland loss in the 21st century: changes under the SRES climate and socio-economic scenarios. Global Environmental Change, 14(1), pp. 69-86.

Nijhawan L et al., 2013, Informed Consent: Issues and Challenges, *Journal of Advanced Pharmaceutical Technology and Research, Vol. 4(3)*

OECD, 2007. Integrating Adaptation to Climate Change in Decision-making at the Urban/Municipal Level in Low- and Middle-income Countries, Paris: OECD Development Assistance Committee.

Ouda, OKM et al. 2017, Long-Term Desalinated Water Demand and Investment Requirements: A Case Study of Riyadh, *Journal of Water Reuse and Desalination*

Patton M.Q and Cochran M, 2002, *A Guide to Using Qualitative Research Methodology*, Medecins San Frontieres, Geneva, Switzerland

Patz, J. & Balbus, J., 2003. Global climate change and air pollution: Interactions and their effects on human health. In: J. Aron & J. Patz, eds. Ecosystem Change and Public Healtgh. J. Aron and J. Patz ed. Baltimore: Hopkins University Press, pp. 379-402.

Peck, JR 2017, Can Hiring Quotas? The Effect of the Nitaqat Program on the Saudi Private Sector, *American Economic Journal, Vol. 9(2)*

Peng, X et al. 2014, Urbanisation and its Consequences, *Demography, Vol. II*

Penrod, J et al 2003, A Discussion of Chain Referral as a Method of Sampling Hard-to-Reach Populations, *Journal of Transcultural Nursing, Vol. 14(2)*

Perez, N.R. 2015. Using urban planning to create a culture of sustainability. Dialogues of Sustainable Urbanisation. Eds. J Condie and A.M Cooper. Sydney: University of Sydney. 25-27.

Peter, M. & Gordon, M., 2007. In pursuit of a healthy urban environment in low- and middle-income nations. In: In Scaling Urban Environmental Challenges: From Local to Global Back. London: Earthscan Publications, pp. 69-105.

Petitjean, M. 2008. The challenge of sustainable development. Sustainable Programs. [Online] (Updated June 2008) Available at: http://www.floraculture international.com [Accessed 4 February 2016].

Pozzar, R., Allen, N., Stamp, K. & Sampson, D. (2014). Focusing on feedback: How nurse practitioners can use focus group interviews to build a patient-centered practice, Journal of the American Association of Nurse Practitioners, 26, 9, pp. 481-487, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

QSR International, 2018, *NVIVO 10 for Windows: Getting Started*, QSR International, Melbourne

Rahman, M.T. (2016). Detection of land/use cover changes and urban sprawl in Al-Khobar, Saudi Arabia: an analysis of multi-temporal remote sensing data. International Journal of Geo-inf, 5.2.

Ramadan, E. (2015). Sustainable urbanisation in the Arabian Gulf Region: Problems and Challenges. *Arts and Social Sciences Journal, Vol. 6(2)*

Ramisetty-Mikler, S and Almakadma, A 2016, Attitudes and Behaviors Towards Risky Driving among Adolescents in Saudi Arabia, *International Journal of Pediatrics and Adolescent Medicine*

Ramisetty-Mikler, S and Almakadma, A. (2016). Attitudes and Behaviors Towards Risky Driving among Adolescents in Saudi Arabia. *International Journal of Pediatrics and Adolescent Medicine*

Rana, M.M.P. (2010). urbanisation and sustainability: challenges and strategies for sustainable urban development in Bangladesh. Environment Development and Sustainability. 13 (1). p.pp. 237–256.

Redman, C.L. (2006). Urban land-use patterns: past, present, and future. In J.L. Hantman and R. Most (eds.). Managing Archaeological Data: Essays in Honour of Sylvia Gaines. Tempe, AZ: Arizona State University. pp. 65-70.

Renaud, B 1981, *Urban Development Policies in Developing Countries*, Oxford University Press, New York

Renaud, B. (2016). *Urban Dimensions of Sustainability and City Resilience*. Riyadh: Saudi Ministry of Municipal and Rural Affairs & UN HABITAT

Rhode, T. E., 1999. Integrating urban and agriculture water management in southern Morocco, s.l.: Arid Lands News Letter.

Richards, JF 1986, "*World Environmental History and Economic Development" in Sustainable Development of the Biosphere*, (eds.) W. C. Clark and R. E. Munn, Laxenburg, Austria, International Institute for Applied Systems Analysis.

Rogers, I. (2015). How Online Qualitative Research Can Drive Richer Results, Marketing Insights, 27, 4, pp. 32-37, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Rostow, W 1953, *The Process of Economic Growth*, Oxford University Press, London

Roy, M. (2009). Planning for Sustainable Urbanisation in Fast Growing Cities: Mitigation and Adaptation Issues Addressed in Dhaka, Bangladesh, Habitat International, Vol 33, No. 3, pp. 276-286.

Saied Al Surf, M., Trigunarsyah, B. & Susilawati, C. (2013). Saudi Arabia's sustainable housing limitations: the experts' views. Smart and Sustainable Built Environment. 2 (3). p.pp. 251–271.

Salam, A. A. 2013. Population and Household Census, Kingdom of Saudi Arabia 2010: Facts and Figures. *International Journal of Humanities and Social Sciences, Vol. 3(16)*.

Sarma, S. K. (2015). Qualitative Research: Examining the Misconceptions, South Asian Journal of Management, 22, 3, pp. 176-191, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Satinmagcorp. 2016. Riyadh Urban. [Online] (updated 2016) Available at http://content.satimagingcorp.com/static/galleryimages/riyadh-urban.jpg

Satterthwaite, D. (2011). How urban societies can adapt to resource shortage and climate change. Philosophical Transactions of the Royal Society. 369(1942).

Saudi Vision 2030. 2016. Programs. [Online] (updated 2016) Available at http://vision2030.gov.sa/en

Säynäjoki, E., Heinonen, J. & Junnila, S. (2014). The Power of Urban Planning on Environmental Sustainability: A Focus Group Study in Finland. Sustainability. 6. p.pp. 6622–6643.

Schmidt, M. (2010). Quantification of transcripts from depth interviews, open-ended responses and focus groups, International Journal of Market Research, vol. 52, no. 4, pp. 483-508. Available from: 10.2501/S1470785309201417. [31 January 2016].

Shah, A. & Sana, S., 2006. The new vision of local governance and the evolving roles of local governments. In: Local Governance in Developing Countries. Washington, DC: The World Bank, pp. 1-46.

Sharma G, 2017, Pros and Cons of Different Sampling Techniques, *International Journal of Applied Research, Vol. 3(7)*

Shen, L-Y. (2011). The Application of Urban Sustainability Indicators–A Comparison Between Various Practices, Habitat International, Vol 35, No. 1, pp. 17-29.

Sidle, R.C., Benson, W.H., Carriger, J.F., & Kamai, T. (2013). Broader perspective on ecosystem vulnerability: consequences for decision-making. Proceedings of the National Academy of Sciences of the United States of America. 110(23) pp. 9201-9208.

Singh, K. D. (2015). Creating Your Own Qualitative Research Approach: Selecting, Integrating and Operationalizing Philosophy, Methodology and Methods, Vision (09722629), 19, 2, pp. 132-146, Business Source Complete, EBSCOhost, viewed 31 January 2016.

Sirryen, SA 2018, *Sustainability Principles in Traditional Islamic Architecture*, accessed 21st November 2018 <https://www.ecomena.org/sustainability-islamic-architecture/>

Soiferman LK, 2010, *Compare and Contrast Inductive and Deductive Research Approaches*, University of Manitoba, Manitoba Strategic environmental assessment in Saudi Arabia Municipalities.

Suaid Arabian Ministry of Planning., 2007. Seventh Development Plan 2000-2005. Riyadh.

Susilawati, C. and Muhammad, Al-Surf. (2011). *Challenges Facing Sustainable Housing in Saudi Arabia: A Current Study Showing the Level of Public Awareness*. Gold Coast: 17th Pacific Rim Real Estate Society Conference (PRRES)

Tacoli, C et al. 2015, *Urbanisation, Rural-Urban Migration and Urban Poverty,* IIED Working Paper, London

Telmesani, A., 1995. Urban Structure and Determinants of a Residential Location: A Case of Riyadh, Urban Development in Saudi Arabia: Challenges and Opportunities, pp.179-213.

Thomas, DR 2006, *A General Inductive Approach for Analysing Qualitative Evaluation Data*, American Journal of Evaluation, Vol. 27(2)

Tipps, DC 1973, Modernization Theory and Comparative Study of Societies: A Critical Perspective, *Comparative Study of Societies, Vol. 15 (2)*

UN Habitat (2009), State of The World Cities Report 2008/9 2009, 'State of The World Cities Report 2008/9'. PLACE: UN-Habitat.

UNDESA – UN Department of Economic and Social Affairs 2014, *World Urbanisation Prospects: 2014 Revision*, UNDESA, New York

UNDP – United Nations Development Programme 2012, *Challenges and Way Forward in the Urban Sector: Sustainable Development in the 21st Century (SD21)*, Geneva: UNDP

UNDP – United Nations Development Programme. (2016). *Sustainable Urbanisation Strategy: UNDP's Support to Sustainable, Inclusive and Resilient Cities in the Developing World.* Geneva: UNDP

UNHABITAT 2016, *Review and Evaluation of Urban Planning Legislation in Saudi Arabia*, Nairobi: UNHABITAT

UNHABITAT 2017, *Harnessing Public-Private Cooperation to Deliver the New Urban Agenda*, UNHABITAT, Nairobi

UNHABITAT 2018, *Atlas of Urban Expansion: Riyadh*, accessed 10th January 2019 <http://www.atlasofurbanexpansion.org/cities/view/Riyadh>

UNHABITAT n.d., *Gender Equality and Sustainable Urbanisation*, UNHABITAT, Nairobi

UNHABITAT. (2018). *Saudi Arabia – Urban Issues*. Retrieved <https://unhabitat.org/saudi-arabia-urban-issues/> [Accessed 26th May 2018]

UNICEF 2013, *Migration Profiles: Saudi Arabia*, Geneva, UNICEF

United Nations Centre for Human Settlement., 2001. Cities in a Globalizing World, Global Report on Human Settlements, London: Earthscan.

United States Geological Survey. 2004. Phoenix Arizona 1973 and 1992. [Online] (updated 2004) Available at http://pubs.usgs.gov/circ/2004/circ1252/10.html

University of Southern California. (2008). Challenges to environmentally responsible energy use in today's society. Science Daily.

Waked, B 2016, *Access to Finance by Saudi SMEs: Constraints and the Impact on their Performance*, Victoria University, Melbourne

Wheeler, S 2004, *Planning Sustainable and Livable Cities*, Routledge, New York

While, A., Jonas, A. & Gibbs, D. (2004). The Environment and the Entrepreneurial City: Searching for the Urban 'Sustainability Fix' in Manchester and Leeds, International Journal of Urban and Regional Research, Vol 28, No. 3, pp. 549-569.

WHO (2015), World Health Organisation. Reducing Global Health Risks through mitigating short-lived climate pollutants. Switzerland: World Health Organisation.

Willis, JW 2007, *Foundations of Qualitative Research: Interpretive and Critical Approaches*, Sage Publications, London

World Cities Culture Forum 2019, Public Green Spaces (Parks and Gardens) Accessed 14th March 2019 < http://www.worldcitiesscultureforum.com/data/of-public-green-space-parks-and-gardens>

World Health Organization. (1997). City planning for health and sustainable development.

Yii, S., Powell, M. & Guadagno, B. (2014). 'The association between investigative interviewers' knowledge of question type and adherence to best-practice interviewing', Legal & Criminological Psychology, 19, 2, pp. 270-281, Academic Search Complete, EBSCOhost, viewed 31 January 2016.

Yusuf, N 2014, Private and Public Healthcare in Saudi Arabia: Future Challenges, *International Journal of Business and Economic Development, Vol. 2(1)*

Zhang, X. (2015). Sustainable urbanisation: a bi-dimensional matrix model. Journal of Cleaner Production. p.pp. 1–9.

Zhao, Y., & Wang. S. (2015). The relationship between urbanisation, economic growth, and energy consumption in China: an econometric perspective. Sustainability. 7(5) pp. 5609-5627.

Zowawi, H.M. et al. (2015). The Potential Role of Social Media Platforms in Community Awareness of Antibiotic Use in the Gulf Cooperation Council States: Luxury or Necessity? *Journal of Medical Internet Research, Vol. 17(10).*

APPENDICES

APPENDIX A: Questionnaire for Exploratory Interviews

This section contains the questionnaires that were used for the three categories of respondents. As noted in chapter 3 of this study report, different set of questions were developed for different categories of respondents.

APPENDIX B: Questionnaire for Main Study Interviews

This section details the questions that were posed to the three categories of residents who participated in the main study. The questions were centred on the six themes that were developed from the objectives of the study. As was the case with exploratory interviews, there were differing set of questions posed to the respondents in each category.

APPENDIX C: Interview Analysis (Pilot study)

Table details has different stakeholders in the SU process and their roles insofar as the dimensions of SU are concerned.

APPENDIX D: Traditional Analysis for the documents

This section outlines the process of analysing the grey literature and the findings obtained from the process, including the knowledge gaps identified.

APPENDIX E: Summary of findings for all groups (Main Fieldwork study)

The following section contains tables and graphs of the issues identified during the main study interviews insofar as the six themes are concerned (which have been analysed in-depth in chapter 6). It also contains tables outlining the findings for each category of respondents as far as the six themes are concerned

APPENDIX F: Factsheet on Study Findings and Proposed SU Framework

The factsheet is a short document that was sent beforehand to participants in the verification of the study findings and analysis of proposed SU framework. The proceedings and results of the verification exercise have been detailed in chapter 7.

APPENDIX G: All reports and documents

The following section contains all reports and documents.

APPENDIX A: Questionnaire for Exploratory Interviews

First Group – Riyadh Residents

Social

1. What impact has urban emission of pollutants and greenhouse gases had on your Municipality, and are there any related direct effects to your household?
2. Which social and environmental strategy do you propose in order to enhance sustainable living in Riyadh?
3. What has the local government done to ensure easier disposal of waste in your residential area?

Political

4. As a resident of Riyadh, do you think the municipal council has designed a regulatory framework that ensures all-encompassing and sustainable private investments? If yes, give an example.
5. Do you think the municipal council is doing enough to sustain urban development at local levels? Please explain.
6. How do political agendas often limit sustainable urbanization, and how can they be improved for the greater good?

Physical

7. Currently, what are the main physical infrastructures that have negatively impacted privacy in your residential area?
8. Do you believe that the growing urbanization has had a negative impact on the quality of agriculture in your municipality? If yes, please give an example and suggest how agriculture can be improved.

Environmental

9. As a resident of Riyadh, what is its overall environmental health situation, and do you think that it is related to the environmental quality in your municipality?
10. Has the current urban development influenced your potential to adjust to climate changes and other disaster prevention? Please explain

Sustainable living

11. Have you experienced any changes in transport infrastructure, and has it improved or harmed the quality of life in your Municipality?
12. Based on your opinion, do you think the quality of urban space in your Municipality influenced its demography? If yes, please give an example.

13. What do you think are the needs of people living in Riyadh and other dessert cities in this country that can enable them live a comfortable life as well as ensure a better life for future generations?

Sustainable communities

14. Based on your opinion, has urbanization affected the accessibility to public space for recreation, such as, playing, walking or cycling; and how much public space is available for such activities?
15. As a citizen of Riyadh, what role can you play to create a sustainable community in Riyadh?

Second Group – Experts

Social

1. In your opinion, how is the rate of recycling of municipal waste advancing; and is the generation of waste per capita increasing or decreasing?

2. In your opinion, does the building code in Riyadh allow for the cultural needs of the residents, and their distinctive cultural characteristics?

3. Which pattern of sprawl is most consistent in socioeconomic and geographical factors, such as, income, transport infrastructure, car ownership, population density, culture and GDP? Please give reasons if no correlation is possible.

Political

4. In on your own opinion, how efficient are the policy integration functions between different administrative levels concerning sustainable urban development?

5. What factors of sustainability do you first account for when creating regulatory frameworks for the urban areas in Riyadh?

6. In your opinion, do you think the political environment is facilitating sustainable urbanization? Kindly expound on your response.

Physical

7. In which regions in Riyadh do the urban built-up areas extend? For example, are they smaller or bigger between urban areas, agricultural projects, or along transport infrastructure?

8. Which land use classes are first converted directly to urban areas, and which are affected thereafter? Similarly, what is the standard amount of land retained for agricultural and recreational purposes?

Environmental

9. What do you think is the relationship between sustainability and environmental well-being?
10. Which policies would enhance the management of water resources as well as put in place effective land use practices in an attempt to creating sustainable urbanization?

Sustainable living

11. What are challenges have been encountered in the attempt of achieving sustainable urbanization and living?
12. Which strategies can the city employ to improve sustainable living as well as to achieve sustainable urbanisation in its efforts geared towards becoming an economic power house in the Middle-East as well as in the world?
13. How coherent is the municipal regulatory policy concerning urban matters, such as, water supply and energy consumption, in Riyadh? Please give examples.

Sustainable communities

14. In your own opinion, how efficient has the municipal council been in contributing to structural funds, and sourcing for funds to be used in the establishment of sustainable urban growth with good environmental quality? How has their decision lowered the impacts of urbanization in other areas?
15. Which sustainable urbanization framework can effectively be integrated in the future development of urban areas in the country?

Third Group – Academics

Social

1. Notably, there is disparity in the allocation of resources, such as, water, food, housing and energy among the municipalities of Riyadh. Do you think that there is a relationship between the consumption of these resources, and Riyadh's potential to distribute these resources?

2. How much do you think Riyadh depends on its region? For instance, please describe the ratio of the required area for recreation, agriculture, housing, waste and transport, in relation to the available area.

3. As an individual who has specialized in urban planning for the last ten years, what can you say are the social barriers hindering the attainment of sustainable urbanisation?

Political

4. How efficient are the municipal council's directives waste management, noise and air quality, which are directly targeted to urban agglomerations?

5. How do political agendas often limit sustainable urbanization and how can political leaders help in achieving sustainable urbanization?
6. Environmental sustainability includes land use and water management. How can Riyadh enhance environmental sustainability especially through policies targeted at land use and water management?

Physical

7. What is the scope and rapidity of urban land-take in Riyadh?

8. How energy efficient are the current, different urbanisation development projects in Riyadh?

Environmental

9. As an expert in urban planning, what is the environmental quality in Riyadh -- waste management, air quality, noise, water supply and biodiversity?
10. Currently, what is the allocation of renewable energy in Riyadh's energy consumption, and which energy fuels mostly used?

Sustainable living

11. Based on trends, such as, demography, lifestyle changes and increase in income, what spatial urban developments are expected in the near future?
12. From your experience, what are the significant success factors and barriers affecting housing in Riyadh, and how can the barriers be controlled?
13. What are the current plans to reduce the cost of living in urban residential areas? Please explain if these plans may be linked to the cost of building materials.

Sustainable communities

14. What have the urban planning department done to manage the urban sprawl in Riyadh in attempt to creating sustainable urbanization?
15. What municipalities in Riyadh are most vulnerable to climate change effects, like, temperature changes, droughts, floods, landslides and sea level rise; and how do current urban projects influence the potential to adjust to such changes and other natural hazards?

APPENDIX B: Questionnaire for Main Study Interviews

First Group– Riyadh Residents (R)

Barriers and Drivers of Sustainable Urbanisation

1. Currently, what are the main physical infrastructures that have negatively impacted privacy in your residential area?
2. How has the growing population negatively affected the quality of agriculture in your municipality?
3. Which are the main pollutants in your municipality?

Improving Quality of Life

4. What is the best strategy to improve the standards of living in Riyadh?
5. What is the main challenge affecting your municipality in improving the standards of living?
6. In order of importance, what are the main needs of the people living in the city of Riyadh?

Social, Environmental and Historical Factors Affecting Sustainable Urbanisation

7. What role do you think you can play in ensuring environmental well-being? Explain.
8. What are the main historical features that have been affected by the rapid urbanisation in your municipality? Explain.
9. What is the main health effect brought about by the environmental quality in your municipality?
10. How has the urban development in your municipality influenced any climate changes and natural disasters?
11. How best can the government involve you in ensuring environmental conservation?

Challenges in Planning for Sustainable Urbanisation

12. To what extent can the local authorities assist in improving the quality of life in your municipality?
13. How can you help the local government sustain urban development in your municipality?
14. What are the main political factors that limit the improvement of your municipality, and the city as a whole?
15. How would you define sustainable urbanisation in planning?

16. Do you think that the current planning regulations are working?
17. Do you think current planning regulations are sustainable?

Impact of Rapid Urbanisation on Desert and Arid Land

18. In your opinion, what has mostly contributed to the poor walkability in your municipality?
19. How has the increased population affected the quality of urban space in your municipality?
20. Among these changes, which ones have you mostly experienced and have been greatly affected by in your municipality?
21. What are the main water challenges in your municipality?

Integration of Sustainable Urbanisation into the Future Development

22. How best can the common citizen participate in ensuring the building of proper housing and other physical infrastructures? Explain.
23. How do you propose your municipality can improve its accessibility to public space for recreation?
24. As a citizen of Riyadh, what role can you play to create a sustainable community in Riyadh?
25. How best can projects of sustainable development encourage the formation of sustainable and cohesive communities?

Second Group – Experts

Barriers and Drivers of Sustainable Urbanisation

1. What are challenges have been encountered in the attempt of achieving sustainable urbanisation and living? Explain.
2. In your opinion, what are the common causes for the increase in municipal waste?
3. In your opinion, what are the main barriers affecting the building code in Riyadh?

Improving Quality of Life

4. In your opinion, what has led to the increase of poor walkability in residential areas?
5. In your own opinion, how has the municipal council contributed to the establishment of sustainable urban growth with good environmental quality?

6. In your own opinion, how has the municipal council contributed to the establishment of sustainable urban growth with good environmental quality?

7. Do you think that current policies & regulations can be improved to avoid potential problems that could emerge created due to change in demographics and lifestyles of the Saudi population?

Social, Environmental and Historical Factors Affecting Sustainable Urbanisation

8. Which pattern of sprawl is most consistent in socioeconomic and geographical factors?

9. What role can you play as an individual in facilitating social cohesion?

10. What do you think is the relationship between sustainability and environmental well-being?

11. Which policies would enhance the management of water resources as well as put in place effective land use practices in an attempt to creating sustainable urbanisation?

12. What necessary actions can you take in ensuring proper environmental conservation?

Impact of Rapid Urbanisation on Desert and Arid Land

13. How do current urban projects influence the potential to adjust to such changes and other natural hazards?
14. How can the local government ensure public awareness on the relevance of protecting water resources in all municipalities?

Challenges in Planning for Sustainable Urbanisation

15. In on your own opinion, what is the most influential policy integration body among the different administrative levels concerning sustainable urban development?

16. What factors of sustainability do your account for when creating regulatory frameworks for the urban areas in Riyadh?

17. In your opinion, how is the political environment facilitating sustainable urbanisation?
18. In which order do the urban built-up areas first extend when developing urban projects?
19. Which land use classes are first converted directly to urban areas, and which are affected thereafter?

20. What is the main cause for the rapidity of urban land-take in Riyadh? Explain.

21. Can current regulation and policies affect the possibilities for sustainable planning in the future?

Integration of Sustainable Urbanisation into the Future Development

22. As an employee of the local government, how best can the municipal officials include you in ensuring sustainable development?
23. Which policies can the city employ to improve sustainable living as well as to achieve sustainable urbanisation in its efforts geared towards becoming an economic power house in the Middle-East as well as in the world?
24. What measures have the municipal regulatory policy taken concerning urban matters, such as, water supply and energy consumption, in Riyadh?
25. Which sustainable urbanisation framework can effectively be integrated in the future development of urban areas in the country?

Third Group – Academics

Barriers and Drivers of Sustainable Urbanisation

1. As an individual who has specialized in urban planning for the last ten years, what can you say are the social barriers hindering the attainment of sustainable urbanisation?
2. What is the main current energy-efficient development project in Riyadh? Explain.
3. What has the municipal council done to rectify waste management, noise and air quality?
4. How can political leaders help in achieving sustainable urbanisation?
5. What design approaches can urban planners take to ensure increased walkability in Riyadh?

Improving Quality of Life

6. What do you think is the reason behind the unequal distribution of local resources, such as, food, energy, housing and energy?
7. In what order do you think the people of Riyadh depend on its region for? Please Explain.
8. What is your main role in ensuring the erection of proper physical infrastructures in Riyadh?
9. What are the current plans to reduce the cost of living in urban residential areas?

Social, Environmental and Historical Factors Affecting Sustainable Urbanisation

10. In your opinion, how can the government ensure social equality in Riyadh?
11. Environmental sustainability includes land use and water management, how can Riyadh enhance environmental sustainability especially through policies targeted at land use and water management?
12. What are the causes for the poor environmental quality in Riyadh?
13. Currently, which energy fuels mostly used in Riyadh?
14. What necessary actions can you take in ensuring proper environmental conservation?
15. In your opinion, what is the main cause for social segregation in Riyadh?

Challenges in Planning for Sustainable Urbanisation

16. What is the main cause for the rapidity of urban land-take in Riyadh? Explain.
17. Do you think they are the land-use policies encourage or hinder sustainable planning?
18. Which master plans, regulations, and land-use policies could provide the policy framework for the urban development?
19. How will current regulations and policies affect the possibilities for sustainable planning in the future?

Impact of Rapid Urbanisation on Desert and Arid Land

20. How do current urban projects influence the potential to adjust to such changes and other natural hazards?
21. What efforts can urban planners contribute to the proper coordination of sustainable water?

Integration of Sustainable Urbanisation into the Future Development

22. Based on trends, such as, demography, lifestyle changes and increase in income, what spatial urban developments are expected in the near future?
23. From your experience, how can barriers affecting housing be controlled in Riyadh?
24. What have the urban planning department done to manage the urban sprawl in Riyadh in attempt to creating sustainable urbanisation?
25. How can you collaborate with other shareholders in facilitating sustainable communities?

APPENDIX C: Interview Analysis (Pilot study)

		Environmental	Social	Physical	Economic	Politics	Forecast (Heath)
Stockholders	Government	literature reviews finding: 1. Without environmental considerations, the sustainable urbanisation program is just like any other current program that is running without adequate consideration of the natural resources required to sustain it. 2. Progressive sustainability movements champion and envision a balance between human needs and natural resource capabilities.	literature reviews finding: 1. An apparent legislative gap that most governments are attempting to fill when instituting sustainability initiatives is the lack of public participation. 2. The government has not responded to crucial sectors such as water and houses that continue to inconvenienc e urban planning especially in the nation's capital and emerging cities. 3. During the intervening period, the government intends to begin training personnel and establishing programs that facilitate readiness of human resources to fill these positions.	literature reviews finding: 1. Developing cities must guard their physical and natural resources in order to avoid making the same mistakes modern economies have made when undergoing urbanisation.	literature reviews finding: 1. In their bid to control urban sprawl, the Saudi Ministry Cabinet approved the enforcement of tax on all undeveloped land with urban boundaries, like Riyadh, in 2015. 2. Saudi Arabia tends to focus a lot on economic activities and for the most part, they are reliant on oil as a means of obtaining economic sustenance.	literature reviews finding: 1. Development control in the form of regulations and laws lack significantly in developing areas develops in response to already existing problems. 2. Saudi Arabia has no plan to track its ecological footprint or develop an environmental plan that adheres to environmental sustenance. 3. Restructuring government facilities would "enable them to perform their tasks, and expand their competencies; ultimately, this will enhance the level and quality of services provided to beneficiaries, and achieve a prosperous future and sustainable development.	literature reviews finding: 1. The quality of healthcare provided has the ability to influence the people's perception of the government's obligation towards the management of diseases and disease prevention policies.
		Exploratory study finding: 1 Different municipalities	Exploratory study finding: 1. At municipal	Exploratory study finding: 1. The incorporation	Exploratory study finding:	Exploratory study finding: 1. The management	Exploratory study finding: 1. The quality of health care

		hold different levels of appreciation for the role played by environmental drivers as a result of the quality of life that they have repeatedly been subjected to, such as, pollution, water supply and waste management. 2. Sustainable urban policies should be embedded in the need to contextualise development socio-culturally. 3. People-centred initiatives and the increasing perception that human beings are also useful resources.	level, the prime objective of the governor and his staff members is to govern the region in accordance with the regulations and public policy of KSA. Their responsibility therefore entails order and stability, the maintenance of public security, the assurance of people's freedoms and rights, and the proper promotion of sustainable economic and social development in Riyadh.	of natural features also goes a long way in curbing rapid urbanisation and managing service provision and infrastructure development that is holistic.	1. All members of the municipal council are responsible for acquiring all the resources availed to the municipality and determining how they can best be used, and setting priorities for use, source for additional funds, and solving all issues in municipal finance.	of urbanisation is not solely exercised by municipalities alone, despite the fact that they undertake a large fragment of those responsibilities. 2. To ensure SU, the organisational structure of Riyadh must work with the support of the sectoral ministries, such as, health, and education to link all development policies.	obtainable in Riyadh's municipalities is directly related to the environmental management strategies imposed by the local government. 2. sustainable urbanisation should lead to human-empowered lifestyles that are less resource-intensive
	Actors	literature reviews finding: 1. Planning needs to take into consideration "the needs of both society and the environment" so that resource extraction and development consolidates "the health of citizens and the vulnerability" of the environment. 2. Housing sustainability is a fundamental proponent in any region because of its	literature reviews finding: 1. The incorporation of natural features also goes a long way in curbing rapid urbanisation and managing service provision and infrastructure development that is holistic. 2. Poor construction has resulted in the increase in complaints from private homeowners	literature reviews finding: 1. An increasing focus in sustainability that included ecosystem services is a fundamental part of planning future cities and future use of natural resources. The environment will have diverse functions for cities this way, and	literature reviews finding: 1. The costs of housing and housing patterns the most fundamental problems in the region. 2. The presence of luxurious homes and world-class restaurants in Riyadh hides the rising concern for poverty growth, as is made evident by the shanty settlements and	literature reviews finding: 1. The cause of this violation is largely attributed to lack of proper building codes resulting in the construction of tall buildings next to low level buildings. 2. To achieve SU, cities must develop strong governance plans that inform ecosystem services and understand the balance between using practical sustainability tools and	literature reviews finding: 1. sustainable urbanisation models should take into consideration the expectations, behaviours, health and value systems of urban citizens.

		direct ties to socio-economic conditions of city residents.	who feel that their privacy is being invaded. In addition, prohibitions instituted by the religion and culture of the people of Riyadh further limit the home owners' hopes of accessing privacy.	cities will be able to actively reduce negative impact on the ecology.	congested urban spaces.	safeguarding environmental health.	
		Exploratory study finding: 1. The continued prevalence of these suburban projects will eventually result in a negative impact on the environment, infrastructure, and traffic in general. 2. Urban developers predict that in 20 years' time the intensification of land utility and elevated population activities and growth in these contiguous urban settlements will put considerable strain on infrastructure, traffic, and urban environment beyond the sustainability limits. 3. Sustainable behaviour of the current generation can produce equal treatment and	Exploratory study finding: 1. The extensive haphazard settlement patterns makes it relatively difficult to facilitate the erection of basic infrastructure into place, including pathways, parks and roads that would smoothen the free movement and interaction of the urban residents. 2. Urban planners recommend that the distribution of such settlements throughout the expanse of the city should be regulated to decrease the creation of hurdles in the creation of mass transportation	Exploratory study finding: 1. A significant number of unauthorized construction s were carried out in large-scale thereby resulting in widespread traffic and environmental issues. 2. Sustainable urbanisation should look towards creating a self-reliant urban environment for both present and future urban inhabitants, with tough resolutions of social, economic, policy-making, and environmental aspects. 3. Urban practitioners must work towards integrating	Exploratory study finding: 1. The available housing spaces in Riyadh include villas and large apartments that are too costly for middle class and young Saudis. 2 Help for the poor should be included in sustainable urbanisation plans since they are often left with no better option that to destroy the environment through the misuse of non-renewable natural resources 3 The notion of cost-effective development using emergent economic criteria should not	Exploratory study finding: 1 Government should also enable participation in urban planning, which eventually encourages empowerment. 2. There is a close interrelatedness between public participation and environmental policy making, which is essential in coming up with suitable policy recommendations for sustainable development.	Exploratory study finding: 1. Improper land utility practices will ultimately be the occasion of detrimental human health and environmental decline. 2. The wide use of non-environmentally friendly technologies for air conditioning, the prevalence of private vehicles that has heightened air pollution and led to an increase in chronic respiratory diseases

		efficiency in the future.	, and the implementation costs. 3. Unplanned urban constructions have also given rise to a series of recurrent security issues across the municipalities in Riyadh, and in the rest of the Kingdom as well.	elements in the natural world with those of the urban landscape.	compromise on productivity or degrade environmental quality		
	User (communities)	literature reviews finding: 1. Researchers have documented that the construction of housing complexes in areas dominated by religious and cultural values is highly likely to create areas of conflict between homeowners and the individual demands. 2. Urban management relies heavily on how resources are allocated and shaped to serve the needs of a population; however, it rarely takes into consideration how much of these resources are left for use in the ecosystem. 3 Sustainable developments	literature reviews finding: 1. The populace of a single Saudi family will continue to decrease over the coming years. Demographic analysis of Riyadh indicates that 60% of the entire population is under 20 years of age and 40% of the remnant population is above 60 years of age. 2. The population of Riyadh will only increase to 35 people/ha by 2030, which is still relatively low when matched up to other Saudi Arabia regions 3. Sustainable cities are also ecologically	literature reviews finding: 1. Physical features can be used as a means of making urban environments more resilient towards the effects of natural disasters such as flooding, heat waves, among other potential natural hazards.	literature reviews finding: 1. Sustainable urbanisation roles should intermingle to allow systemic change through time, and to enable cities adapt to the transition into a green economy 2. Sustainable urbanisation should promote equity between present and future generations of a society. It should reduce disparities in the access of benefits and also ensure fairness and equality.	literature reviews finding: 1. Housing privacy or the lack thereof is one of the greatest issues in Riyadh. The cause of this violation is largely attributed to lack of proper building codes resulting in the construction of tall buildings next to low level buildings. 2. Another reason for urban sprawl in Riyadh is the slow paced development of areas approved by local authorities. 3. Local and municipal governments were transparent about sustainability plans	literature reviews finding: 1. Planning needs to take into consideration “the needs of both society and the environment” so that resource extraction and development consolidates “the health of citizens and the vulnerability” of the environment.

		are dependent on the ability to include the public and other stakeholders in all processes. It also includes effective communication to create transparency among stakeholders.	conscious and this prolongs the existence of natural and non-renewable resources for use in future.				
		Exploratory study finding: 1. Prohibitions instituted by the religion and culture of the people of Riyadh further limit the home owners' hopes of accessing privacy. 2. People in different municipalities strongly believe that environmental drivers have significant influence on the overall urbanization in Riyadh. 3. Sustainable development ought to be anticipatory and proactive.	Exploratory study finding: 1. The number of people living in Riyadh is considerably low in comparison to the available land. 2. The urban population in municipalities such as AlDiriyah, Olaya, Naseem, and Nmar is expanding rapidly as seen by the increasing number of migrants, and the growing native community. 3. As Saudi Arabia considers future plans, its natural resources should be included in the implementation process.	Exploratory study finding: 1 Proper use of physical features enhances the infrastructure available in a city and improves networking within the urban area for its inhabitants. 2. Urban landscapes within the ecological systems should reinforce environmental well-being. They would also be built around the patterns of everyday living and find ways to enhance sufficiency through design of infrastructure specifically those that affect mobility, consumption, waste and food systems	Exploratory study finding: 1. In spite of the high level of income in Riyadh, the two-floor houses (villas) offered are still considerably above the economic means of most people, including the vast majority that entails low-income earners and the youthful generation. 2. Sustainable urbanisation should have the notion of cost-effective development using emergent economic criteria that does not compromise on productivity or degrade environmental quality	Exploratory study finding: 1. Policy makers' and urban planners' decisions should reshape demographic, socioeconomic, institutional, and environmental factors for the attainment of rapid urbanization in Riyadh. 2. Sustainable urbanisation has gotten worse as a result of the local authorities' inability to expand economic activities that may support the growing urban population 3. The public must also be involved in decisions that are likely to directly impact their standards of living and quality of life.	Exploratory study finding: 1. Evolution of smart cities must sustain a good quality of life in urban areas and plan cities that take into consideration how a dynamic sociocultural environment can attract well-educated, skilled and sophisticated inhabitants who enable the positive development of the urban environment. 2. Health control is important in overall development.

APPENDIX D: Traditional Analysis for the documents

Outline 1: Identify the drivers and barriers to sustainable urbanisation in desert cities.

Themes	Quotation from Government Files	Opinion for analysis in line with objective and research question
Society aspirations	"Urbanresidents in well-planned cities enjoy betteraccess to employment opportunities, healthcare, education and public services comparedto their rural counterparts. Well-managedurban areas have lower per capita energy,climate and ecosystem footprints and lowercosts per person for infrastructure and basicservices. And the concentration of resources,ideas and energy in urban areas is fertileground for the creativity and technologicalinnovation needed to solve the many developmentalchallenges the world faces today (UNDP, pp.4)."	The process of urbanisation in developed countries is often hampered by poor management, thereby resulting in unequal, exclusionary, and disjointed cities that are exposed to increased risk of violence, especially in the disenfranchised sections of the population that cannot easily access formal political systems.
Social inclusion	"...offer integrated solutions combiningits expertise across core thematic areas,build and work through a broad coalitionof partners and deepen cross-country andregional networks of learning and exchange (UNDP, pp.3)."	Social inclusion should encompass policy vision in documents easily accessible by the public, and that can be easily translated into clear directions and movements that are not only tangible, but can be implemented to attain real results.
Urban poverty	"Urban poverty is growing and theWorld Bank estimates that, by 2035, mostof the world's extreme poor will be found inurban areas (UNDP, pp. 4)."	Urban poverty entails low per capita energy in urban areas, high climate and ecological footprints, and

		relatively higher costs of living with regard to basic necessities and housing infrastructure.
Affordability	"Affordability is another barrier,due to high connection fees and tariffs. Thiscan lead to continued use of unsustainableenergy sources such as kerosene for lightingor solid fuels for cooking and heating, whichcause indoor pollution and increased healthand safety risks (UNDP, pp.4)."	Due to poor affordability, informal or illegal arrangements are often organised by the urban population for the purpose of meeting daily needs. This is often with regard to energy. The more economies develop, the higher the demand for such provisions will be, thus making it less affordable for the common citizen.
High cost of living	"The increasing concentration of wealthin a few attractive cities is driving up thecost of living, forcing lower-paid residentsto migrate to distant suburbs or relocateentirely (UNDP, pp.6)."	Migrant workers are more often paid less in comparison to the common citizen. They therefore experience higher levels of exclusion and exploitation with regard to the cost of living.
Poor goal definition	"For instance,cities have a clear role in ‘ending poverty’(Goal 1); ‘reducing inequality’ (Goal10); promoting inclusive and sustainablegrowth, and full and productiveemployment (Goal 8); and taking urgentaction to combat climate change and itsimpacts (Goal 13) (UNDP, pp.3)."	It is imperative to foster cooperation among the groups taking part at local level, as based on local demands. This will help to curb the risks of and discrepancies in actions, the erection of complementary actions among the actors,

		and in creating coherence between local and national processes of urbanisation.
Poor economic dynamism	"The economicdynamism of cities provides livelihoodopportunities and social mobility possibilitiesnot found in rural areas. Throughouthistory, cities have been hubs of innovationin technology, commerce, social organizationand ideas (UNDP, pp.4)."	The government should promote business opportunities by structuring the labour environment to target specific training, and offer support to local economic enterprises so as to help them thrive and extent important social security coverage to the target informal sector workers.
Urban inequality	"High andextreme inequality in cities is a driver of violence and unrest (UNDP, pp.6)	Municipalities and cities should take part in integrating migrants and others in minority communities into the social fabric of the city, or put them in camps and other temporary arrangements that would help them properly transition into the urban life.
Initiatives	"Throughouthistory, cities have been hubs of innovationin technology, commerce, social organizationand ideas. The concentration of people,resources and ideas allows innovation tooccur at tremendous speed, generatingeconomic activity and wealth at unprecedented rates (UNDP, pp. 4)."	Urban areas must actively participate in the promotion of local economic advancement by creating opportunities that are based on the establishment of comparative advantages and other unique aspects of their localities.

Impractical scheme development	"In all instances, the choicescities make to create an enabling environmentfor development and growth shoulddepend on dialogue and partnership amonglocal-level stakeholders (e.g., employers,workers' organizations, entrepreneur organization and informal workers)...(UNDP, pp.14)"	Scheme development should be an approach that is not only holistic, but also highly risk-informed.
Impractical goals and expectations	"The compact sizeof cities makes the creation of mechanismsto promote collective action and to institutionalizenegotiations between disparatesocietal interests easier than is possible atthe national level (UNDP, pp.13).	The local government should have a broader devolution and decentralisation of power that utilises multi-level government approaches for the purpose of enhancing practicality of intervention strategies.
Lack of transparency	"Developing effective, accountable andtransparent institutions has become a keytarget under SDG Goal 16, signalling the significance of a functioning public service (UNDP, pp.12)."	Government approaches should focus not only on the spatial limits that focus on where the systems should be applied, but also on the aspects of how and whom for the purpose of enhancing transparency, and logical flows through each government level.
Lack of finance	"City leaders repeatedlypoint to the **lack of urban financing** as oneof the primary barriers to long-term development.In many instances, the lack of financingoptions also drives cities towards unsustainableshort-term solutions, for instance byselling land for commercial development as ameans of	Several municipal authorities continue to face limited access to revenue along with the autonomy of generating this revenue. They therefore need proper access to more affordable and developed

	financing municipal infrastructure...(UNDP, pp.6)"	administrative capacities at all tiers of the local government.
Poor land allocation	**"Limited public space for city residents**to access and limited opportunities forthe public to influence decision-makingregarding public space or land use22 exposecities to the risk of future internal conflict(gang violence, riots, civil unrest) and socialexclusion based on a population's immigrationor socio-economic status (UNDP, pp.6)."	Public space should remain an important part of the urban development, and officials must come up with choices in which government officials confront impending short-term gains in overall economic growth with regard to land development and impending long-term losses related to social inclusion of the urban population.
Security	"The urbanpoor and other vulnerable groups (migrants,IDPs, female-headed households) fare worst,as they lack access to housing, tenure securityand land ownership. In many developingcountries, this often leads to the emergenceof slum settlements (UNDP, pp.6)."	The degree of social cohesion in urban areas has a strong correlation with the rates of violence, crime and peaceful co-existence. Devoid of strong participation of the local governance systems, the security needs of the marginalised, poor, and minority groups will be neglected.
Corruption	"At the same time, thedemand for services in these cities attractssignificant labor in-migration. Poor migrantworkers (and particularly female domesticworkers) often experience high degrees ofexclusion and	Current public authorities are facing a hard time in maintaining effective governance in large urban areas as a result of

	exploitation in multiple forms (UNDP, pp.6).	corruption. If left unchecked, this could lead to the erosion of government and institutional capabilities in enforcing fights against corruption.
Inadequate social infrastructure	**"Limited public space for city residents** to access and limited opportunities for the public to influence decision-making regarding public space or land use expose cities to the risk of future internal conflict (gang violence, riots, civil unrest) and social exclusion based on a population's immigration or socio-economic status (UNDP, pp.6).	Cities can be made more accommodative by providing broader access to social infrastructures and public spaces that offer opportunities of interaction and that would facilitate cultural and social development and inclusion for families from diverse cultures and backgrounds.
Poor government accountability	"Developing countries will needefficient, multi-tiered policy and institutional mechanisms to address the complex andinterconnected consequences of urbanizationacross all tiers of government and withnon-state actors (UNDP, pp.7)."	Government agencies, especially line ministries, and other sectors need to take part in implementation of strategies at local levels in a manner that ensures that the policies reach the local people at all levels.
Population distribution	"...change and disastersin cities isproportionately affect thepoor, who normally settle in compact settlementsand slums...(UNDP, pp.4)"	Ultimately, the creation of well-off residential areas and neighbourhoods can lead to the establishment of gated communities that privatize their community and worsen the socio-economic gaps between the different communities, with

		regard to health, employment and education.
Documentation constraints	"Developing effective, accountable andtransparent institutions has become a keytarget under SDG Goal 16, signalling the significance of a functioning public service (UNDP, pp.12)."	The urban governance should give more focus not only to the governance systems of urban areas, but also the spatial boundaries, and the specifics of local development processes.
High cost of transportation	"The lack of an integrated and efficient public transport system, meanwhile, severely hampers mobility and accessibility to social and economic activities (particularly for those unable to afford private cars)...(UNDP, pp.10)"	Hampered mobility in urban areas is mainly as a result of the poor public transport systems and mechanisms put in place. This hinders accessibility to economic and social activities, and increases traffic hazards, traffic congestion and pollution, while grossly affecting those who cannot afford private cars.
Land displacement	"Urbanizationalso displaces open space such as farmland,wetlands, parks and forests and reduceswater supply as excessive ground waterusage depletes water tables. These degradationssignificantly reduce the ability ofnatural ecosystems to filter air and waterand provide other ecosystem services (UNDP, pp.4)."	Semi-urban areas are more often excluded from land use planning under several governance and planning systems. This presents inevitable challenges when it comes to interventions aiming at reducing inequality and ending poverty.
Urban pollution	"For many cities,municipal waste is a significant problem.Globally, 3 billion urban residents generate1.2 kg of waste a	The increase in urban pollution is brought about by the surrounding

	day - 1.3 billion tonnesper year.14 This generates challenges suchas GHG from transporting waste, marinepollution (including plastics) from coastal (UNDP, pp.4)"	territories which are dominated by working-age rural dwellers that move to the city looking for opportunities, while leaving the old and very young in their rural areas. Areas surrounding the urban territories should be used for the provision of natural resources, so as to reduce urban pollution.
Urban employment	"In many developing countries, **urbanunemployment and underemployment**are now a rising concern, particularly foryouth, women and marginalized groups.One major element of city economies thatstill generates less attention is the **informaleconomy**, yet it accounts for 50 percent to80 percent of a city's GDP and provides livelihoodsfor the majority of poor and excludedgroups in many developing countries (UNDP, pp.6)."	Efforts to reduce poverty and increase urban employment should be targeted at understanding the levels of urban poverty, and identifying and overcoming these processes as a whole.
Poor regulatory frameworks	"...pressure on land and housing, particularly in urban areas where supply is limited and policy and regulatory frameworks to manage demand are poorly developed (UNDP, pp.6)".	The establishment of better regulatory frameworks calls for better integration across all different levels of the government's policy making processes.
Declining rural population	"Declining populations in ruralareas also pose challenges for agricultureand for continuing to maintain social serviceprovision for smaller, scattered, aging populations (UNDP, pp.7)."	Compact settlements and slums, because of their nature, are highly prone to natural disasters, such as, floods and sandstorms.

		Similarly, people who live in those areas hold a more informal settlement status thus hardly ever receive social services required basic infrastructure. Approximately one in seven people in Riyadh live in deteriorated or overcrowded areas in the urban spaces.
Outside Investors	"The influence of economic factors such asoutside investors and local economic elitesis often disproportionately high in developingcities...(UNDP, pp.14)"	Several local governments in developed and developing cities face constraints with regard to their financial and technical knowledge in the administration of effective zone regulations and building codes.
Inconsistency in urban planning	"A recent analysis demonstratedhow poorer districts... receive proportionatelylower per capita local developmentbudgets, despite demonstrating greaterneed for service provision (UNDP, pp.12."	When it comes to urban planning, the government's choice of programs, choices and plans should be based on the people's demands, and coordinated across all levels of administration and planning.
Themes	Quotation from Government Files	
Incompatible urban composition	"...composition of the urban environment in cities such as planning and formation of residential districts, business centers and entertainment, road networks and other vital land uses (UNHABITAT, pp.6)."	

Poor evaluation of legislation	"...the speed and dynamic of growth and expansion of cities led to ignore the review and evaluation of the legislation which have already been enacted and know to what extent they are updated and keeping up with the status quo variables besides their suitability to the needs of the population (UNHABITAT, pp.6)."
Numerous urban planning bodies	"There are several authorities linked to urban planning, such as the High Commission for the Development of Arriyadh (HCDA), Makkah and the Holy sites Development Authority, Al-Madinah Al-Munawarah Development Authority, Royal Commission for Jubail and Yanbu, in addition to the companies related to AMANAHs such as Jeddah Development and Urban Regeneration Company (JUDRC)... (UNHABITAT, pp.10)."
Poor understanding of urban planning	"...legislative framework on urban planning in Saudi Arabia is explained and clarified based on clarifying the Basic Governance Law of Saudi Arabia and then the authorities and bodies concerned with

legislative framework	legislation besides patterns and pillars of urban legislation (UNHABITAT, pp.10)."
Dominance of ministerial solutions	"However, the ministerial resolutions related to planning have had the largest share compared to other legislative pillars. Based on analysis of the entered data it is clear that there are three types of legislation related to urban planning: laws, regulations and circulars in connection with urban planning (UNHABITAT, pp.13)."
Outdated means of communication	**"Circulars:** Represent the instructions issued by the minister, his representative or any official of the ministry to announce new regulations and updates regarding actions, resolutions and resolutions (UNHABITAT, pp.13)."
Defined regional laws	"The Law of regions: Is concerned with economic, social and urban development, identify the needs of the regions and specify the development projects for them. The regions consist of councils known as "Regional Council" which is headed by the Amir of the Region (UNHABITAT, pp.13)."

Improved advisory council	'The Law of Shura Council: One of the main tasks of the Council is to provide suggestions and recommendations for the central authority or the king to improve the process of development and quality of life. The members of the Council of Ministers conduct accountability procedures on the performance of their ministries, in addition to the discussion of government policies, and plans for social and economic development, and the annual reports submitted by ministries (UNHABITAT, pp.13)."
Improved regulatory body	"The Law of Council of Ministers: The Council of Ministers has been established as an executive body and presided over by the King. The Council of Ministers plays an important and essential role in the urban planning process, where there are many laws and regulations issued by the Council of Ministers (UNHABITAT, pp.13)."
Established country objectives	"The basic Law (law) of Governance in Saudi Arabia is a monarchy whereby the King is the highest legislative authority in the state. This law is considered the most

	important as it specifies the nature of the country as well as defines the objectives and responsibilities of the government, the relationship between the ruler and the citizen besides the Fees and rights of the citizen. The Law of Governance includes the Council of Ministers, the Shura Council Law and Law areas (UNHABITAT, pp.13)."
Stable supreme regulations	"Most of the laws and regulations have been issued pursuant to a royal decree (UNHABITAT, pp.13)."
Regular updating of urban planning policies	"The Law of Annoying, health-damaging and dangerous stores. Issued in 1382 H. Has been updated in 1423 H and the Law of Eminent Domain and Temporary Taking of Property which has been issued in 1392 H and updated in 1424 H (UNHABITAT, pp.13)."
Secure land use regulations	"The Law dealt with the definition of terms used in the Law as well as the basic principles of urban planning (land uses, roads and allocation of lands for specialized uses, land expropriation for public use...Etc...)... (UNHABITAT, pp.18)."

Outdated ministerial functional laws	"This law consists of five chapters and 49 articles which have not been updated since the date of issuance of this law. The law deals with the powers and functions of the Minister of Municipal and Rural Affairs, mayors and heads of municipalities and municipal councils, in addition to municipal finance sources and rural affairs (UNHABITAT, pp.18)."
Boundary regulations	"Urban Growth Boundary is a policy to guide and control the urban development through setting of appropriate boundaries for localization of urban activities to accommodate urban growth within a specified period of time and provision of public services and facilities in accordance with the directives of the National Spatial Strategy and specific stages of development (UNHABITAT, pp.18)."
Availability of public interest policies	"This law has been issued in 1424 H to replace the Law of expropriation for public interest, which was issued in 1392 H. The Law consists of three chapters and 27 articles. Law of whitelands fees (1437 H/2016) (UNHABITAT, pp.18)."

Poor execution of urban plans	"All regions faced difficulties due to the lack of resources for implementation, the lack of staff and executive capacity to carry out the implementation and evaluation process, the non-availability of updated data for following-up and evaluation and the lack of institutional structures to lead the process of preparations and local implementation of the Regional plans (UNHABITAT, pp.18)."
Monitoring and Evaluation shortcomings	"Has been approved in 2001 and lack implementation programs for monitoring and evaluation so it had been subject to updating in 1437 H to avoid shortcomings caused by non-participation of various state authorities and bodies, as well as development of implementation program to carry out the process of following-up and evaluation (UNHABITAT, pp.18)."
Slow approval of plans	"Some provinces, such as Jeddah Province, still updating their structure plan while there are other cities which work and depend on their structure plan, despite its oldness and non-approval thereof (UNHABITAT, pp.18)."

Technical issues	"However, such updating has began since 1430 H, but it faces many difficulties, whether in terms of technical issues due to the fact that the local planning plays several roles, some of which goes beyond the local role of planning or as a result of deficiencies in the technical capacity of the consultant offices to carry out works in accordance with the RFP requirements (UNHABITAT, pp.18)."
Slow review and approval process	"Some of them based on the structure plans and the guidelines have not considered the mountainous areas and some resolutions have been issued which gave powers to AMANAHs to review and approve land subdivision/zoning plans (UNHABITAT, pp.18)."

Conclusion of Analysis

The drivers and barriers mentioned above are very much complex in and of themselves. Adding to their complexity is the idea that they are interconnected in several ways. For example, a city that aspires to develop in technological aspects, compact ways, or n ways that would affect suburban sprawl greatly depends on the presence of an efficient public transportation system. Similarly, also affects the issue of spatial inequality since, lifestyle, and eventually its ability to bring in new entrepreneurs and inbound private and public investors. As such, the factors affecting

urbanisation are based on bran infrastructure, the urban degree of poverty, inequality among the people, economic developments and outcomes, social cohesion, crime and conflict.

The second analysis above indicates that the legislative framework for the urban planning in the Kingdom of Saudi Arabia forms the fundamental foundation upon which the legislations of the Kingdom's cities are formed. These findings have established that the entire Kingdom greatly relies on legislation founded on Islamic laws. As a result, all the resolutions and laws must not be in opposition of any Islamic teachings and stipulations. The policies issued for the establishment of sustainable living is also highly dependent on the basic governance law. The urban planning framework in the Kingdom is therefore centred on circulars that were initially issued, and then applied to several of the Kingdom's cities beforehand. a great part of the legislations are in the form of circulars that were mainly issued by the Minister for Rural and Municipal Affairs, whereas the majority of laws were given by royal decrees that made possible the resolution of the Ministers' Council, together with the bylaws that were passed as a result of the resolutions of the Ministers' Council.

Outline 2: Examine the social, environmental and historical factors influencing urbanisation.

Themes	**Quotation from Government Files**	**Opinion for analysis in line with objective and research question**
Biodiversity	"Urbanizationalso displaces open space such as farmland,wetlands, parks and forests and reduceswater supply as excessive ground waterusage depletes water tables (Renaud, 2016, pp.10)."	The lack of biodiversity and eventual degradations caused by urbanisation has reduced the ability of the natural ecosystem to sift out water, air and properly provide for other ecosystems.
Climate change	**"Cities are highly vulnerable to climatechange impacts**. This is due to the fact thatmany cities are located in highly	There is a growing recognition that the governance of disaster risk

	exposedcoastal areas and riverbanks, which areprone to sea level rise, typhoons, storms,flash floods and landslides tables (Renaud, 2016, pp.10)."	cannot be distinguished from the management of other risks, such as climatic change, conflict, financial crisis, and environmental degradation.
Residential waste	"Yet,cities also present unique opportunitiesfor developing innovative waste managementsuch as waste-to-energy technologies(e.g., methane from landfills), reusing andrecycling as an economic opportunity andecosystem-based sewage treatment(Renaud, 2016, pp.12)."	Residential waste management measures should include the composting of waste to generate energy from the combustion of methane emissions in garbage sites, and increasing the amount of forest carbon sequestration for the purpose of reducing the general amount of greenhouse gases in the air.
Industrial waste	"Pollution and water contaminationand depletion may be seen as necessaryside effects to rapid modernization, with theassumption that, once cities become moredeveloped, the rate of pollution and environmentaldestruction will decrease and eventuallyrecede (Renaud, 2016, pp.10)."	Local government officials are often tempted to ignore pollution from industrial waste for the purpose of immediate economic advancement. However, this often leads to long-term clean up costs, and further remediation.
Infrastructure networks	"...whethercities develop in smart, compact ways orthrough suburban sprawl depends in parton the availability of efficient publictransport infrastructure (which encouragescompact development around	Decisions based on infrastructure influence the degree to which poverty and inequality may arise, thus inevitably affecting the overall economic

	publictransportation hubs)...(Renaud, 2016, pp.16)"	development, conflict, crime and social cohesion.
Accessibility to services	"GCC dependence on desalinization and long-distance delivery) (Renaud, 2016, pp.23)"	A significant population of the city is still in dire need of proper housing facilities and access to basic social services and infrastructure, such as, sanitation and water. This has led to significant pressure on the availing of housing and land, especially in urban areas where the supply is strained, and policy and regulatory frameworks that manage the demands are poorly established.
Government advocacy	"The existence of a capable bureaucracy for the effective provision of goods and services...(Renaud, 2016, pp.17)"	Government advocacy requires an overall integrated system of planning services for all municipal authorities. This is for the purpose of addressing all important city development challenges, such as, energy systems, mobility systems, equal service provision, inclusive local and growth development through modern governance techniques, disaster and risk-resilient systems, and

		post-conflict recovery intervention strategies.
Urban planning advocacy	"socially inclusive (by diminishing poverty & increasing employment) (Renaud, 2016, pp.23)"	These approaches require an inclusive and broad consultations and coalition-building, long-term planning of visions, proper future analysis and capacity building, and the finding of financial packages that sequence and combine funding from public and private entities.
Demography	"Riyadh (4.2m) political capital and leading source of governance...The Saudi population is very young with 51% under 25 in 2010. - International migrants play a very large role with a 27.8% share in 2010 (Renaud, 2016, pp.23)."	The world is currently experiencing and unprecedented transitioning process. Since the global power is shifting, extreme poverty is currently dropping to historic lows, and more people than ever are now residing in cities with new technologies, thus revolutionising social integration and cohesion, and behaviors of key industries.
Rights protection	"At the same time, thedemand for services in these cities attractssignificant labor in-migration. Poor migrantworkers (and particularly female domesticworkers) often experience high degrees of exclusion and exploitation in multiple forms (Renaud, 2016, pp.6)."	Inclusive cities are those that find ways of enabling people from all walks of life to take part in the creation of opportunities, and in the sharing of benefits of developments, such as,

		access to sustainable livelihoods, affordable and legal housing, and basic social services.
Civic engagement	"Recognizing the complexity of city developmentand the multiplicity of factors thatdetermine urban development outcomesinevitably requires broad coalition-buildingand partnerships (Renaud, 2016, pp.34)."	Civic administrators must need to move past stakeholder consultation and public involvement so as to embrace deeper substantive engagement of stakeholders and beneficiaries in every aspect of design, implementation and governance in all local initiatives.
City resilience	"The resilience of the city will determine the expected length of recovery from a catastrophic shock, which is calibrated on precedent studies of recovery from previous disasters...(Renaud, 2016, pp.9)"	The speed of recovery of a city is dependent on its economic and social resilience.
Finance reforms	"To maintain *or* improve the resilience of GCC cities, politically and technically difficult local finance reforms are necessary during this decade...(Renaud, 2016, pp.14)"	Municipal authorities need support with regard to cost urban development management, general financial management, and climate finance interventions from a variety of local, national and international platforms.
Corruption	"Cities around the world will face different challenges unique to their regional characteristics. For example, in the Arab region, the main challenges cities face are	Local economic development interventions should be more focused on the key aspects of sub-national authorities and

	lack of accountability and participation...(Renaud, 2016, pp.14)"	actors, together with their role in the development of consensus-building platforms and dialogue so as to reduce the impacts of corruption on the sustainability of the city.
Government accountability	"The existence of mechanisms to make governments accountable—to reduce corruption and make the political system more responsive to all groups in society...(Renaud, 2016, pp.17)	The main challenges of government accountability are brought about by demographic pressures, introduction of smaller urban centres, inequality, and extreme poverty levels in peri-urban areas.
Norms and legal principles	"The existence of the rule of law—the presence of norms and legal principles that reflect the beliefs and aspirations of the society, as well as the mechanisms to ensure the impersonal application of norms...(Renaud, 2016, pp.17)"	In sections where national authority structures cease to exist or become to lackluster and weak, local -level structures and other municipal administrators should be involved in reaching out to local communities.
Income and wealth distribution	"Enhance linkages and coherence across and between **national and local planning and budgeting** instruments and processes (Renaud, 2016, pp.22)"	The development of the private sector, engagement and resilience will form the foundations of recovery efforts concerning income and wealth distribution.
Spatial fragmentation	"Cities are confronted with increased spatialinequalities within cities and between cities.With rapidly growing populations and limitedland, the spatial planning choices	Coming up with well-off neighbourhoods will lead to the creation of privatised communities that facilitate

	cities makecan risk creating ‘ghettos’ of concentratedpoverty, crime, unemployment and limitedbasic services (Renaud, 2016, pp.12)".	spatial inequality and fragmentation.
City size	"Large cities grew even faster at stressful rates around 7.0% per year (Renaud, 2016, pp.34)."	The rural-urban migration seen in the city is highly gendered, with economic migrants from African cities being male, whereas migrants from Southeast Asia consisting of a younger population of women in search of employment opportunities.
Labor markets	"...the choices in cities make to create an enabling environmentfor development and growth shoulddepend on dialogue and partnership amonglocal-level stakeholders (e.g., employers,workers’ organizations, entrepreneur organizationand informal workers), based on anunderstanding of business opportunities and the labour environment to target skillstraining, support local enterprises to thrive,and extend social security coverage toinformal workers (Renaud, 2016, pp.16)."	Plans should include the promotion of productive capacities, as well as inclusive business and vale chains for all.
Local economy	"Creation of an enabling environment for sustainable and inclusive businessand philanthropy including informingnational and urban economic developmentpolicies and plans (Renaud, 2016, pp.23)."	The enabling environment should include the provision of technical expertise in the adoption of integrated and multidimensional systems approach, for the purpose of attaining inclusiveness,

		resilience and urban sustainability.
Rate of growth	"The Saudi population has grown at the very high rate of 3.8% per year, from 5.745m to 26.246 m between 1970 and 2010 (Renaud, 2016, pp.23)."	The city should therefore focus on the creation of an enabling environment that is both sustainable and inclusive, which is based on philanthropies that include urban economic advancement policies and plans.
Quality of redistribution programs	"...gendered migration patterns mayprovide opportunities to promote greater social, political and economic empowermentfor women. Where men migrate to urbanareas, opportunities may arise to mobilize andcapacitate rural women to play greater rolesin the rural economic and political spheres... (Renaud, 2016, pp.34)"	Should be structured to target subsidies that will impact the efficiency of redistribution programs.
Natural risks	"Nationally, Saudi urban sustainability faces four major natural risks: global warming, water, energy and food. Climatic conditions over the 2.2million km2 of Saudi territory minimize the role of agriculture with 1.4% of arable land, 4.7% share of employment and a 2% share of GDP (Renaud, 2016, pp.23)."	The city must take part in the strengthening of both local and national governance systems for the integration of climate and risk/disaster management in all development plans and investments.
Transport networks	"The lack of the trained cadres or staff to manage the transport network contributesin aggravating the problem. The traffic congestions in the city center area draw theattention to the necessity introducingdecentralization as regards the distribution ofvarious land uses and	The challenge with transport networks in cities is based on overcoming the short-term investment infrastructures and costs that affect mass systems of transit. This requires

	services with the aim of helping to reduce congestion in the citycenter (ADA, 2010, pp.24)."	effective planning, political involvement, and the implementation and access of proper financing.
Energy networks	"Globally, more than 90% of new electricity generated in 2015 came from renewable sources. Highest level since 1974. (Half of this growth came from wind farms alone) (Renaud, 2016, pp.13)"	The city should have a shared long-term goal of a more sustainable and green city that motivates investments in more efficient transportation and energy networks, regardless of whether that structure demands higher up-front costs in the short-term.

Themes	**Quotations from Government files**
Few impactful legislations	"Through interviews with urban legislation experts it has been found that there are 26 legislations including laws, regulations and circulars which have a significant impact on urban planning (UNHABITAT, pp.27)."
Obsolete regulations for social development	"...the obsoleteness of legislation and their non-keeping up with developments and updates, besides the large number of circulars and the difficulty of obtaining and referring thereto (UNHABITAT, pp.27)."
Conflict in execution	"...the lack of an integrated Law of planning", In addition to "the opposed and contradictory resolutions, lack of clarity in the powers and

	conflicting of powers (UNHABITAT, pp.27)."
Inconsistency of plans with environmental infrastructure	"...38% have suggested the importance of taking into account the nature of cities upon developing legislation and laws (UNHABITAT, pp.27)."
Few relevant policies	"...it has been found that the most important legislation affecting town planning are the "Urban Growth Boundaries Regulations" (received 96% of the views of the respondents), followed by "The Law of the Protection of Public Facilities" (which received 35% of the views of the respondents), and then the resolution of the Mayor's powers, the standards of plot divisions and the structure and indicative plans of cities (which received 30% of the views of the respondents) (UNHABITAT, pp.27)."
Quickly evolving urban cities	"...the obsoleteness of legislation which are not keeping up with the current issues of urban planning in Saudi cities (UNHABITAT, pp.27)."
Poor performance of urban legislation	"...officials pointed to 17 suggestions for the development of the position and performance

	of urban legislation in the Kingdom (UNHABITAT, pp.33)."
Importance of control of lands	"The most prominent of these suggestions are: taking into account the nature of the cities and the creation of a legislative reference regarding how to plan and control lands (UNHABITAT, pp.33)."
Slow pace of administrative coordination	"Specify the key and concerned elements and bodies to implement and activate the regional plans (regional councils, AMANAHs, Ministry of Municipal and Rural Affairs)... Clarify the types of powers (regulatory, technical, coordination) (UNHABITAT, pp.22)."
Lack of staff	"The plans of all regions have been prepared. With the exception of the Regional plan of Madinah and Makkah. All regions faced difficulties due to the lack of resources for implementation, the lack of staff and executive capacity to carry out the implementation and evaluation process, the non-availability of updated data for following-up and evaluation and the lack of institutional structures to lead the process of preparations and local implementation of the

	Regional plans. There is also no updated methodology covering all technical aspects of the Regional plan (UNHABITAT, pp.20)."
Difficulty due to bureaucracy	"The local plans of all cities in the Kingdom are currently subject to updating. However, such updating has begun since 1430 H, but it faces many difficulties, whether in terms of technical issues due to the fact that the local planning plays several roles, some of which goes beyond the local role of planning or as a result of deficiencies in the technical capacity of the consultant offices to carry out works in accordance with the RFP requirements. So there are some cities either their local plans are old and have not been updated or has no local plan to depend on in planning process (UNHABITAT, pp.20)."
Lack of coordination between relevant bodies	"Difficulty of coordinating with the experts of legislation related to urban planning in the Kingdom, which led to conduct interviews only with 8 out of 12 (UNHABITAT, pp.27)."
Poor familiarity and challenges caused by referring to the resolutions and circulars	"Still some cities are using them, especially in the central areas of the cities, in spite of the fact that such plans are old and non-approved,

	which mostly dated back to the year 1402 H (UNHABITAT, pp.20)."
Too much circulars and legislation	"Has been approved in 2001 and lack implementation programs for monitoring and evaluation so it had been subject to updating in 1437 H to avoid shortcomings caused by non-participation of various state authorities and bodies, as well as development of implementation program to carry out the process of following-up and evaluation (UNHABITAT, pp.20)."
Opposition and contradiction of the resolutions	"Improve the manner of preparation of plot divisions to be in conformity with the requirements of the population and the public interest (UNHABITAT, pp.24)."
Poor comprehensive framework for all legislation	"Spatial regulations (whether within the new plans or existing areas) in terms of the types of land uses surrounding them which are conflicting or in conformity with them (UNHABITAT, pp.21)."
Lack of indicative plan	"Identify factors affecting the setting of standards in all social, economic, environmental and urban dimensions... Showing developed planning standards including the (religious, educational, cultural,

	health, social, security, entertainment, and sports, commercial and municipal services) (UNHABITAT, pp.21)." "There is confusion between the concept of indicative plan and the local plan (UNHABITAT, pp.20)."

Conclusion of Analysis

Cities in the developing world are currently growing at a very fast rate. The findings above suggest that the city must have an initial proposal, which is based on international sustainability standards, for the purpose of involving a greater number of city and national leaders in a conversation based on understanding the factors affecting sustainability in local urban areas. This conversation requires the integration of the civil society and private sector stakeholders who will act as key development partners in the attainment of sustainability. Such conversations will promote deeper understanding of how the factors affecting sustainability are integrated, and in coming up with plans of how best to contribute to these critical areas of development (UNDESA, 2012).

Based on the more dominant challenges that are affecting the use of legislation, findings reveal that experts and the Kingdom's officials all agree that they are facing a common challenge revolving around the real time application of urban regulations and laws in the cities (HOK, 2013). With respect to comparisons based on percentages (UNHABITAT, 2016), comparisons between the opinions of the AMANAHs and experts show that the poor updating and obsoleteness of regulations represented the highest percentages. with regard to the aforementioned theme, the most important challenge, as revealed by the percentages listed in the report, was the obvious obsoleteness of laws, and the fact that these bylaws could barely keep up with the ongoing changes, the slow pace of work at administrative offices, the insufficient staff, challenges brought about by bureaucracy, the poor coordination between the relevant bodies, and the unavailability of technical

staff members. similarly, another important finding established that the most prominent proposal for change, as jointly identified by both experts and the AMANAH of the involved cities, entail taking into consideration the nature of the cities before passing a legislation. In addition, the AMANAHs believed that another important proposal was based on the need to give the AMANAH the power to update any existing bylaws and legislations.

Outline 3: Determine the main impacts of rapid urbanisation in desert cities.

Themes	**Quotation from Government Files**	**Opinion for analysis in line with objective and research question**
Deterioration of living standards	"Unemployment rate will go up leading to deterioration of living conditions of thepopulation...(ADA, 2010, pp.7)"	There is a huge gap between population increase and economic advancement.
Deterioration of open spaces	"Rapid growth often results in developmenton hazard-prone sites (coastlines, riverbeds, hill-slopes), which increases exposureand vulnerability to climate and disasterrisk (Renaud, 2016, pp.16)."	The decisions aimed at integrating measures, like disaster risk management, and climate change intervention, into the national development strategies are crucial for the city since they will lead to the enhancement of sustainability and resilience against climatic and disaster risks.
Deterioration of wildlife reserves	"The wildlife, soil and agriculture will also suffer from the spread of urban and theresulting activities which lead to the extinction of many types of wildlife despite the rarityof these wildlife in the desert environment and the loss of wide areas of arable landswithin partially the urban context (ADA, 2010, pp.17)."	The vegetation cover in wildlife reserves is deteriorating due to aggressive grazing, and other uncontrolled recreational and development activities.

Unclear functional preference	"The current methods of financing and investment in infrastructure do not encourage consumption rationalization and lower the chances for cost effective financing for development in the future(ADA, 2010, pp.20)."	There are minimal functional mechanisms applicable in the implementation of approved urban legislations and policies that deal with ensuring the efficiency of development, especially those that are suited to the city's unique design.
Traffic congestion	"The traffic congestions in the city center area draws the attention to the necessity introducing decentralization as regards the distribution of various land uses and services with the aim of helping to reduce congestion (ADA, 2010, pp.24)."	There is no comprehensive plan for the establishment of a transport system in the central metropolitan part of the city.
Incomprehensive traffic management technologies	"...gaining high efficiency in operating the transport system through improved planning of transport, management of the traffic movement and enforcement of traffic regulations (ADA, 2010, pp.25)."	There is an increased pressure on the current road networks and their multiple functions.
Inconsistent government responsibility	"The duality and overlapping of powers among the responsible agencies in the city,which provide and approve the urban development plans and policies in the city(ADA, 2010, pp.25)."	This has led to the overlapping of powers, and major conflicts in several urban areas of the city.
Imbalanced social affluence	"...challenge for sustaining the level of social affluence for the city dwellers and providing job opportunities for the increasing numbers of the Saudi youth who enter the labor market annually(ADA, 2010, pp.16)."	The social and political inclusion of more vulnerable groups in the city should entail the development of ways in which the government can be more representative of

		these populations in ways that can improve the participation of these groups in budgeting, planning and the delivery of social services.
Ineffective land subdivisions	"The city is facing a big shortage in public facilities. The situation will worsen with thecontinuation of the current development policies which will result in the decrease of thenumber of the population served (ADA, 2010, pp.9)."	Proper land subdivision is responsible for ensuring the control of various activities and resolutions based on the planning and development of activities in given frameworks.
Loss of natural features	"The continuation of the current development policies will lead to the continued loss of theopen spaces (ADA, 2010, pp.9)."	This will likely continue under the increase population and their social activities because there are no known regulations or controls to guide against the misuse of natural resources.
Rainwater drainage	"Rainfall with relatively high rates in a short period of time will lead to flooding problems. This is due to the poor design of the drainage system and that most areas are not covered with a developed system (ADA, 2010, pp.20)."	Current rainwater drainage does not drain in appropriate manners, thus allowing occurrence of floods in certain urban areas.
Uncontrolled recreational facilities	"The vegetation cover in areas adjoining the urban growth deteriorates due to aggressive grazing and other uncontrolled recreational activities (ADA, 2010, pp.20)."	This will continue under the rising population, particularly because there are no specific regulatory policies.
Unplanned waste disposal	"Theinability to providing the whole urban area with sewerage system has led to	This has led to the rise in groundwater levels at

	dischargingwaste through septic tanks (ADA, 2010, pp.19)."	historic highs, and resulted in its pollution.
Increased air pollution	"A center that achieves a good urban environment by providing safe and secured pedestrian walkways that create the appropriate climate and reduce the annoyances (such as the vision, noise and pollution) (ADA, 2010, pp.24)."	There is no specific organisation that has direct responsibility for air pollution.
Increased ground water pollution	"This will lead to more pollution of underground water and will expose the general health to danger, in addition to loss and waste of water resources (ADA, 2010, pp.17)."	This is caused by the fact that sewerage systems cover a significant amount of the total area allocated in the first urban limit area.
Poor environmental quality	"The city is facing another challenge regarding air pollution. The dense and increasing traffic movement in the city and other pollution generators (ADA, 2010, pp.17)."	This is mostly experienced in the industrial zones, such as those close to power stations and cement factory refineries.
Insufficient energy supply	"Developing cities also face the choice to draw their energy production from a single energy source or to develop more diversified energy systems, making them more resilient to shocks such as natural disasters or suddenfuel price hikes (Renaud, 2016, pp.10)".	The city should invest in appropriate energy systems, and the added policy and technical complexity of the planning for and municipal codes for energy efficiency, or policies regarding investment in renewable sources of energy.
Poor public health	"Sewerage systems...to damages of the public health as well as other architecturaldamages to the buildings and structures, foundations as well as the road system (ADA, 2010, pp.19)."	This has been greatly prompted by the city's inability to provide the entire urban area with a proper sewerage system.
Unplanned architecture	"...the urban growth will continue with the samepace as it has done in the recent past	This has been influenced by the unguided population

	and will spread in all direction without a clear pattern of functional preferences...(ADA, 2010, pp.19)"	growth of 10.5 million in the city (ADA, 2010).
Unsuitable communications networks	"This refers to the deficiency in the number of telephone lines per individual compared to other countries, as well as the supply of telecommunication systems do not match the demand for them (ADA, 2010, pp.19)."	The current communications network is unsuitable from several points of view.
Insufficient financing and investment strategies	"The current methods of financing and investment in infrastructure do not encourage consumption rationalization and lower the chances for cost effective financing for development in the future (ADA, 2010, pp.20)."	There is an impactful lack of financial mechanism in the housing sector.
Poor housing finance mechanisms	"The inability of housing industry to provide high quality residences that areenvironment friendly and of low cost to meet the requirements of the increasingnumbers of families (ADA, 2010, pp.27)."	House construction ratios are not in line with the demand for housing in the future of the growing city.
Public service deficiencies	"The insufficiency of the general, qualified human resources for dealing with urban development issues (ADA, 2010, pp.29)."	Current demands for power and water far outweigh the amount produced and supplied.
Centralism in decision making	"Centralism in planning decision making, development activities as most of the sub municipalities do not have the power to approve building licensees for the area they supervise (ADA, 2010, pp.28)."	There is poor coordination of the responsibilities among implementation authorities in the city.

Themes	Quotations from Government files
Poor coordination and planning among urban workers	"Coordination and conducting of a series of workshops (four workshops) had been carried out at the level of the cities of the Kingdom for the purpose of obtaining and find out the views of experts of the AMANAHs and municipalities about legislation related to urban planning based on applying the tool of evaluation of legislation designed by the UN-Habitat Program, and then obtained the most important and key observations and recommendations for the development of legislation (UNHABITAT, pp.34)."
Large implementation teams	"The management and coordination of the workshops had been through a work team composed of: experts from the UN-Habitat Program and experts from King Abdul Aziz University, in addition to the participation of representatives from the relevant departments of the Ministry of Municipal and Rural Affairs (UNHABITAT, pp.34)."
Availability of training workshops	"Workshops aim at identifying the gap in laws and regulations related to urban planning and what are the most important challenges facing the application of laws, regulations and circulars in the Kingdom through using the tool developed by the UN-Habitat Program to evaluate legislation and to listen to the opinions of experts from the AMANAHs in the field of urban

	legislation, which contribute to reach at a clear vision about the status of urban legislation through a concept analysis of the strengths and weaknesses and identifying the relationship between urban legislation and the authorities concerned with planning in the kingdom, then come up with suggestions and recommendations for the development of urban legislation in the Kingdom and activate their role (UNHABITAT, pp.35)."
Burdening of specialised teams	"Most of the attendees are engineers and directors of a variety of departments within AMANAHs or municipalities. Some of them represent the Urban Planning Department, Local Plan Department, Cadastre and Land Administration and Department of Building Permits, which are departments that have a direct relationship with the urban legislation through the work carried out by them (UNHABITAT, pp.35)."
Limited laws and circulations	"... theme of land management is one of the most importance themes due to the number of laws and circulars that have been issued and documented during the past years, but it have been clear from the four workshops that a limited number of laws and circulars repeatedly mentioned by the participants have been recorded (UNHABITAT, pp.38)."

Governance by supreme order	"The release of supreme order in relation to the possession of land\Squatter, issued in 1393 H, whereby land possession\Squatter has been canceled (UNHABITAT, pp.39)."
More funding restrictions	"The issuance of a supreme order in connection with grants which stipulate that they should not be granted to any citizen or governmental body without an approved plan (UNHABITAT, pp.39)."
Restrictive land use laws	"Structure and indicative plans, if approved, shall be a legislation that must be referred to in dealing with transactions of change of landuse. Land procedures regulations (UNHABITAT, pp.39)."
Rigorous approval processes	"A special ministerial circular within the approved plans to convert the landuse from residential to commercial which shall be within the powers of the Mayor and must be out of the percentage of services allocated for the plan. Separation of residential lands from agricultural Lands (UNHABITAT, pp.39)."
Inconsistency in urban planning tools	"For urban planning tools there was an inconsistency among all regarding the identification of the names of planning levels (there is inconsistency among the participants between the indicative, detailed and local plans in terms of naming), whereas a large number of them pointed out that this is due to lack of consolidated regulations or one

	consolidated Law determines the levels of planning, identifies and explains the nomenclature of planning levels of different types (UNHABITAT, pp.39)."
Poor access to regulations and circulars	"Regarding the Register of cadastrally surveyed plots and the Law of acquisition/ownership, in general, there was a consensus among the participants regarding the existence of a limited regulations and circulars related to these two aspects... (UNHABITAT, pp.40)."
Inappropriate status quo variables	"...as well as they are obsolete and inappropriate with the status quo variables, besides a large number of participants pointed out that there is no implementation regulations in connection with Law of acquisition/ownership other than their different types (UNHABITAT, pp.40)."
Inconsistency of urban planning levels	"... the identification of the names of planning levels (there is inconsistency among the participants between the indicative, detailed and local plans in terms of naming) (UNHABITAT, pp.40)."
Poor support for social housing	"For organizational support for social housing, the large percentage of the participants pointed out to the lack of regulations concerning this aspect as well as mentioned that this aspect is supposed to be within the competencies of the Ministry of Housing and not within the powers of the municipalities or the Ministry of Municipal and Rural Affairs (UNHABITAT, pp.41)."

Poor consolidated regulations	"...whereas a large number of them pointed out that this is due to lack of consolidated regulations or one consolidated Law determines the levels of planning, identifies and explains the nomenclature of planning levels of different types (UNHABITAT, pp.41)."
Incompatible land use changes	"The theme of changing the landuses is considered one of the themes which observed with most similarity in views of the participants through using diligence and judgment in dealing with transactions of Landuse changing inside the cities or refer to the detailed plan in case of updating and approval upon dealing with transactions related to this aspect (UNHABITAT, pp.43)."
Under qualified specialised bodies	"...while the mechanisms, procedures and ability to implement legislation in addition to the responsibilities and roles of institutions and involved bodies got the average rating... (UNHABITAT, pp.43)."
Poor land registry	"Land owners do not register their land only when needed, and is land is usually not registered in municipalities except upon the construction and development of the land/plot by the owner (UNHABITAT, pp.44)."
Poor indicative urban boundaries	"There are levels of planning such as structure, indicative, detailed and urban boundaries. After the approval of the plan it becomes binding to comply with

	the law of land, development trends, the heights and building regulations. There is no legislation or regulations compel the municipalities to prepare these plans and abide by them and other standards of planning. Regulations related to urban planning tools are not enough (UNHABITAT, pp.45)." "Energy and water consumption can be addressed on a municipal scale with the implementation of **minimum building standards** (HOK, pp.7)."
Availability of urban planning schools	"Variety of planning schools, which was at the head of the ministerial pyramid that brought all these applications and their names such as structure, indicative, structure, local and detailed (UNHABITAT, pp.45)."

Conclusion of Analysis

Resilient cities are characterised by a wide range of livelihood and employment opportunities, equitable allocation of resources;better preparation and protection against climate change and natural disasters, economic shocks; proper settlement of disputes; and equal governing opportunities. These cities work to eliminate risk and hinder any crises, be it natural or man-made, and avert major development setbacks while promoting humanitarian security, enhancing humanitarian peace building, and enabling long-term development efforts in line with global standards.

It is crucial to develop modern laws that compel the average land owner to register their pieces of land for the purpose of allowing the administrative powers to take into account the nature of every

city and any inconsistencies related to the characteristics of the cities. It should be made a necessity that upon the passing of legislation involving cadastrally surveyed plots, administrative powers should undertake awareness programmes so that land owners will be able to register their plots. Suggestions found in the reports used also revealed the need to activate geodetic networks at the levels of the Kingdoms by giving each municipality the power to document and manage the entire process, rather than allowing only the Ministry of Justice to undertake this responsibility (UNHABITAT, 2016). This will make it easier to come up with a program that registers plots, and the ministry will be the main centre for the registration and collection of data from all plots in the cities. However, this will only be made possible if there is a sequence of levels of planning that include the regional, national, local, and sub-regional, at structural and highly detailed levels. These bodies should also be able to agree on the names of levels that define their responsibilities, and that re binding as applied to all the cities of the Kingdom (HOK, 2013).

Outline 4: Identify the challenges of sustainable urbanisation and sustainable living in Riyadh.

Themes	**Quotation from Government Files**	**Opinion for analysis in line with objective and research question**
Duality and overlapping of administrative powers	"There is no single authority or administrative unit that is responsible for assembly and categorization of the approved policies (ADA, 2010, pp.28)."	This has resulted in the overlapping of powers and conflicts in several urban areas of the city.
Lack of coordination among authorities	"The lack of coordination between the responsible and implementing authorities in the city (the public facilities and services, the environmental aspects, transport and thetraffic movement etc...) (ADA, 2010, pp.28)."	This is brought about by the absence of a single reference that links these authorities in matters concerning urban development.
Poor mechanisms for implementing policies	"Lack of appropriate mechanisms for implementing approved urban policies, to deal with and manage development problems efficiently (ADA, 2010, pp.28)."	There is no specified single authority responsible for the categorization and assembly of any approved policies.

Poor guidelines for urban design	"Absence of guidelines for urban design (ADA, 2010, pp.29)."	House construction ratios will be inconsistent with the demand for housing in the next few years.
Poor land use regulations	"Absence land use plan and regulations and program covering all issues in the urbanArea (ADA, 2010, pp.29)."	The land that is often assigned for specific purposes is diverted for other projects, mostly due to corruption and poor follow-up systems.
Insufficient urban planning personnel	"The insufficiency of the general, qualified human resources for dealing with urbandevelopment issues (ADA, 2010, pp.29)."	There is a lot of conflict in land ownership assigned sub-divisions in the public service commissions.
Insufficient competitive capabilities	"An international center for the location of international, Islamic, and regional politicaland economic organizations(ADA, 2010, pp.33)."	The city needs to improve its competitive capabilities according to international standards so as to ensure effective urban dynamics.
Complex visions	"...a strongly shared vision ofa sustainable, inclusive and resilient citycan provide the policy space for municipalauthorities to invest in poverty alleviation and slum upgrading programmes to enable all city residents to share in future prosperity (Renaud, 2016, pp.24)."	The city is having a hard time attracting international organisations and in the preservation of historic sites in the city that are useful in maintaining certain aspects that conform to the unique structure and shape of the city.
Poor merging of local cultures and traditions	"Arriyadh should be a beautiful city as to be reflected in an architectural form that isdistinguished and integrated with the social and cultural life and a center for the Islamic culture and arts (Renaud, 2016, pp.36)."	The future vision of the city should be dependent on conceptions expressing the values and traditions based on the original local culture

		enjoyed in the city's Arab and Muslim society.
Poor continuity of growth policies	"In principle it might be stated that the selected alternative was in combination with the option corridor and growth policies (Renaud, 2016, pp.73)."	There is urgent need to change a variety of policies so as to make them consistent with the increasing population growth rates.
Mono-centric city system	"Therefore, the urban structure for those alternatives was similar in many ways, but they differ in their details, especially in the functional structures and the way in the various city sectors (Renaud, 2016, pp.73)."	The city needs to change to be a multi-centric system so that it can be supported by main sub-centres that will yield an outward growing population that will receive appropriate services and activities.
Centralised government and private activities	"A center for motivating the chances of selection and competition for the private sector to define the nature and location of investment in the development and employment in various city sections (Renaud, 2016, pp.36)."	Structuring of privatization programmes should be made so as to maintain the advantages of resource management, and not merely influence the financing parts of the network.
Poor preservation of historic sites	"Preservation of the archeological buildings and historical sites (Renaud, 2016, pp.68)."	Historic sites should maintain specific aspects of its elements in a manner that conforms to the urban nature and shape of the city.
Endangered traffic and pedestrian safety	"The steady and fast growth of the city and the use of private cars as the main means of transport in the city (which represents 90% of the total vehicular trips) had	Traffic networks ought to provide more open spaces in commercial and residential quarters that will

	contributed to the creation of many traffic issues and problems (ADA, 2010, pp.24)".	be used as streets and pedestrian walkways.
High living standards	"Focus on gradual change from dependence on the public sector, as the main financer and job provider is given to motivate the private sector to play a bigger role in driving development of the city and to enable it to achieve better living standards for its population (ADA, 2010, pp.59)."	The livelihood in the city should allow the inhabitants with the freedom of choosing their own appropriate living style.
Insufficient employment opportunities	"Unemployment rate will go up leading to deterioration of living conditions of the Population (ADA, 2010, pp.7)."	This will result in a gap between the economic growth and population increase.
Poor communication networks	"Development of communication and information technology services, to provide high level services. Currently a project of installing a multi-layers optical fiber system, to improve the capacity is being implemented (ADA, 2010, pp.59)".	The city should find a way of linking its urban areas with an up-to-date telecommunication network that is focused on adopting new technologies in this regard.

Themes	**Quotations from Government files**
Poor allocation of land for recreation	"Regarding the technical aspect of Mechanisms for allocation of sufficient area for streets, there was a consensus among all Amanahs in the four workshops that this aspect has been given 3 degrees (which equal to that the percentage allocated for streets

	range between 16 to 25%) (UNHABITAT, pp.47)."
Inconsistency in legislation enforcement	"...there is inconsistencies in the applications of legislation related to this aspect from city to another. Also the Amanahs of Riyadh, Eastern region, Gassim, Alihsa, with the Amanahs of Tabuk, Northern Borders, Jouf and Hail provided that to implement the planning rate of 33% only to the residential plans, and for the non-residential uses there is no clear reference for the rate of streets, and it has been referred to the guidelines of planning of plans of stores and workshops as regard to the industrial uses (UNHABITAT, pp.48)."
Poor land allocation mechanisms	"And it has been agreed that the lack of mechanism for allocation of certain space for the public spaces causes in most times that the percentage allocated for the streets will have the greater part from the total of 33%. It worth mentioning that Amanah of Riyadh region has referred that it is used to assign a rate of 40% for the plans with space greater 80.000 square meters and above provided that it shall include all services including the

	streets and public spaces, parks, parks, the municipal, educational and health services (UNHABITAT, pp.48)."
Requirements for land use are not specified	"The lands shall be contributed by their owners in the framework of conducting the lands division, also the requirements are not clear and will give the chance for the personal estimations upon approval) with the exception of AMANAH of Riyadh region which has given the full degree (4) for this aspect (which equals to: The lands shall be contributed by their owners within the framework of procedures of plot division or the rights of construction conditioned for the lands which have been contributed) (UNHABITAT, pp.48)."
Uneven allocation of priority	"In case of a main road (structural) passing through the land, all AMANAHs have agreed that according to the Implementing Regulations of the urban boundaries, the matter shall be referred to the expropriation authority and the deed shall be divided into two deeds then the percentage of 33% shall be deducted from each deed separately (UNHABITAT, pp.48)."

Inconsistent sub-division plans	"...the planning percentage (33%) shall be determined only at the level of the sub-division/zoning plans and not at the level of district or city as whole, for each sub-division plan separately from the adjacent plans which will cause shortage in the services sometimes at the highest levels and weakness in the hierarchy of the network of roads at the high level (UNHABITAT, pp.48)."
No guidance for public buildings design	"It has been agreed among all AMANAHs that there is no reference or guidelines for the buildings designing and public spaces which resulted in the visual pollution occur in many cities. In addition to the reference to the fact that the local detailed plan followed by subdivision plans includes only the heights of buildings, FAR, and setbacks (UNHABITAT, pp.48)." "**Lot size restrictions** is the amount of land used for one single family home. The restrictions do not apply to apartment or other multiple dwelling unit buildings (HOK, pp.41)."

Unclear allocation of responsibilities in regional workshops	"Regarding the technical aspect of responsibility related to the ownership (maintenance), there is agreement among AMANAHs of Riyadh, Gassim, Eastern region (first workshop), and AMANAHs of Tabuk, Northern Borders, Aljouf and Hail (second workshop) as this aspect has been given zero degree (which coincide with: the responsibility is completely not clear and/or divided between the different institutions)... (UNHABITAT, pp.48)."
Insufficient resources for maintenance of public areas	"Most of the AMANAHs pointed out that the human and financial resources for the AMANAHs are completely insufficient for the effective maintenance of the public spaces (UNHABITAT, pp.48)."
Poor allocation of responsibility for maintenance of public spaces	"...there is no agreement among the work groups regarding the responsibility of maintenance of the public spaces whether to be made by the AMANAH or by the owner. While there is an agreement among the AMANAHs of Al-Baha, Aseer and Jazan that the responsibility of maintenance of the public spaces must be made by the AMANAH but it shall be provided with the

	sufficient resources for that (UNHABITAT, pp.48)."
No mechanism for coordination	"As for the responsibilities and roles of enterprises and concerned bodies, all these AMANAHs have agreed that there are many bodies overlapping in the implementation of the legislation related to this aspect, but there is no clear mechanism for coordination between them, where the matter was different with regard to AMANAHs of Riyadh, Ihsaa, Baha, Aseer and Jazan as the roles and responsibilities related to this aspect are concentrated in one body which is the AMANAH, but it always does not work efficiently (UNHABITAT, pp.49)."
Land infringement	"...confirmed that the responsibility of development of parks was not specified clearly, and whether it shall be made by the developer or the AMANAH, which sometimes leads to leave the lands allocated for parks as whitelands which makes these lands subject to infringement (UNHABITAT, pp.49)."
Poor following of existing mechanisms	"...while the AMANAHs of Baha, Asir and Jizan added that this mechanism is not

	followed effectively at all times. Riyadh AMANAH, however, has also added that there are many initiatives related to the development rights such as incentives for assigning of additional percentages of the land for the services (UNHABITAT, pp.51)."
Slow transfer of deeds	"...carry out the review and approval of land allocated for the public spaces in the plans, then the notary public carries out the transfer of deeds of these lands to the AMANAHs, but this process does not work efficiently at all times. The matter was different for the AMANAHs of Baha, Aseer and Jazan as the roles and institutional responsibility in this aspect is concentrated on one institution which is the AMANAH but it always does not work efficiently (UNHABITAT, pp.51)."
Poor connectivity of roads and districts	"...but the regulations and bylaws are not conforming, which will lead sometimes to certain negatives in terms of connectivity with the city at the level of districts and the neighbourhoods, while the AMANAHs of Baha, Aseer and Jazan added that upon the approval of a proposed subdivision plan in the city of Abha, Aseer AMANAH used to

	review the roads network with the adjacent plans which contributes to securing the connectivity of the roads network at the level of the city (UNHABITAT, pp.51)."
Poor security in new infrastructure	"...regulations and guidelines for designing of buildings and urban spaces, we find that it has been agreed among all AMANAHs that the current regulations, represented in what is contained in the detailed plans of the cities, are determining only the setbacks and heights of buildings and FAR, and completely does not deal with the other details except that included in the Saudi building code in a manner that achieves the factor of security for the buildings, and that the controls and bylaws are clear and specified only at the level of the plot (residential villa) but not specified at the higher levels (residential neighborhood and district), in addition to that there is no guidelines for the urban design and standards for the designing of buildings and urban spaces (UNHABITAT, pp.52)."

Conclusion of Analysis

The future growth of the city requires the preparation of a comprehensive strategic plan that can easily accommodate its high growth rates, while catering for city requirements, and working as the main tool to be used in research, plans, conceptions and visions concerning future development plans. As a result of the economic boom brought about by the rise in oil prices, government expenditure should increase with regard to urban development, which has already reached high levels in comparison to national standards. The main challenges of sustainable urbanisation therefore revolve around city growth as affected by its distribution of big projects, as integrated in the city fabric.

After reviewing the results of the evaluations performed by the UNHABITAT, as based on the functional efficiency aspect for the framework of the allocation of enough area for public recreational activities, it was found that the Gassim, AMANAHs of Riyadh, the Ihsaa and the Eastern Province all agreed with the AMANAHs of Tabuk, Hail, Jouf and the Northern borders, that there is no direct mechanism for the division of percentages for public spaces, like pedestrian walkways, parks, yards, and parking spaces. Hence, these procedures are unclear during application processes, which results in most cases that the percentages allowed for the streets far exceeds that which is allowed for the public spaces. When it comes to the roles and responsibilities of enterprises and other relevant bodies, all the aforementioned AMANAHs agree that there are several bodies overlapping during implementation stages of legislation that concern these aspects; however, there is still no identified mechanism for ensuring smooth coordination between these bodies. On the other hand, the contrary was visible with regard to the Ihsaa, Aseer, Baha, Jazan, and the AMANAHs of Riyadh because their roles and responsibilities with regard to this project are concentrated in one main body, which is the AMANAH. The report also suggests that the AMANAH still does not work efficiently. When it comes to the ability to implement any legislation, all MANAHs have agreed that the available human and financial resources are not enough for the implementation of intended legislative frameworks. However, they may improve

within the next 2 to 5 years, with the further development of their abilities, and the upgrading of each body's efficiency (UNHABITAT, 2016).

Outline 5: Develop a strategy to achieve sustainable urbanisation, and promote sustainable living.

Themes	**Quotation from Government Files**	**Opinion for analysis in line with objective and research question**
Rationilisation of resources	"Continued depletion and deterioration of the open spaces and resources particularly in WadiHanifa (ADA, 2010, pp.19)."	Sufficient resources and integration of proper technology will yield better livelihoods in all parts of the city.
Development of efficient urbanisation systems	"Activation of the up to date systems and theenvironmental conditions in order toachieve an effective growth and limits the negative impacts at the regional andnational levels (ADA, 2010, pp.35)."	This development should conform to the city's desert environment, and integrate proper and optimum use of technology and urban planning.
Exploitation of available opportunities	"Encouragement of investment and innovation in the fields of sustainable powertechnologies and its exploitation for the city development (ADA, 2010, pp.35)."	Opportunities should be exploited for urban development in the heart of the desert, while taking into account any obstacles that may occur.
Maintenance of natural environment resources	"A city in which the relationship between the citizens and their environment areactivated to achieve optimum symbiosis between the people’s life, their activities (ADA, 2010, pp.36)."	Citizens should utilise the places in which they reside in a way that protects and maintains the natural environment and its resources, thus preserving its beauty.
Integration of economic and urban policies	"...solutions form an **overall package ofintegrated development planning services**for municipal authorities to	These should include mobility systems and sustainable energy,

	address fundamentalcity development challenges...(Renaud, 2016, pp.16)"	inclusiveness and the provision of social services, and the overall integration of governance to mitigate any economic and natural disasters.
Attracting private investments	"...motivating the chances of selection and competition for the private sector to define the nature and location of investment in the development and employment in various city sections (ADA, 2010, pp.36)."	Should encourage the establishment of regulations that support the private sector's employment and investments.
Raising qualification of human resources	"Build **capacity of municipal authorities** to address targeted urban development issues using tools such as poverty data analysis,vulnerability assessment, futures analysis and scenario-building, integrated urban development planning, participatory designthinking and coalition-building, reporting and measuring outcomes (Renaud, 2016, pp.22)."	There is great insufficiency when it comes to the qualification of human resources that deal with urban development issues.
Architectural accord	"A center that realizes an architectural accord which is reflected in a harmonious,practical and functional distribution of the urban areas and their elements in a waythat facilitate the understanding of the place and the easiness of movement at both thelocal and urban levels (ADA, 2010, pp.37).	City should ensure the spatial diversification of all social activities at urban levels, together with any public festivals and events that form part of the urban structure of the city and the citizen's daily lives.
Spatial diversification of social and public events	"A center that ensures the spatial diversification at urban levels for social activities, public events and festivals and makes them part of the urban structure of the city and part of the people’s daily life (ADA, 2010, pp.37)."	The city should come up with spatial master plans and other operational delivery plans suitable for the social and development

		sectors that will encourage proper diversification.
Introduction of pedestrian walkways	"...providing safe and secured pedestrian walkways that create the appropriate climate and reduce the annoyances (ADA, 2010, pp.37)."	Annoyances mainly entail vision, noise and air pollution.
Reduction of noise and pollution	"Control of pollution sources and set up a plan for environmental reform (ADA, 2010, pp.56)."	This can be established through ongoing supervision of the city's environment quality.
Diversification of local architectural patterns	"Nevertheless, it lacks a clear architectural identity, as of the architectural patterns that do not match with the local environment (ADA, 2010, pp.37)."	The city has a deficiency in green areas, and lacks landscaping in several parts of the city.
Accommodation of new trends	"...architectural and urban excellence and accommodates the new trends in moderndevelopment (ADA, 2010, pp.37)."	This will ensure diversification and continuity in the local architectural patterns, while highlighting and symbolic and historical aspects.

Themes	**Quotations from Government files**
Creation of sustainable energy levels	"Saudi Arabian cities, like many around the world, are facing a rapid increase in the demand for transport energy. Although improvements in vehicle efficiency can moderate the growth in energy demand, Vehicle Kilometers Traveled (VKT) per capita is growing and VKT reductions will be

	essential in the long run to achieve sustainable energy goals (HOK, pp.4)."
Reducing transportation fuel	"The study found that total **transportation fuel** use savings are dependent on the development intensity and amount of sustainable transportation investment that is implemented in a new development. The degree of investment is dependent on community type—a smaller-scale community will not require the same degree of transit infrastructure as a larger city. While total per-capita fuel use is larger in dependent communities, fuel savings are still significant (HOK, pp.7)."
Using reclaimed water	"Walking is especially important to encourage as a means of addressing the obesity challenges within the Kingdom. In order to promote walkability (during the appropriate times of year and times of day) it is important to provide a comfortable microclimate. This can be accomplished through municipal landscaping and street trees, as well as other shading devices. This requires irrigation, but can be designed to a water budget informed

	by the available **reclaimed Water** (HOK, pp.7)." **"Criteria evaluated in this study showed energy savings up to 75% and water savings up to 63% from BAU** (HOK, pp.7)."
District cooling	"Another key strategy for energy savings at a municipal scale is **district cooling**. District cooling involves the provision of cooling to multiple buildings or facilities from one or more central cooling plants that are interconnected to the cooling users via a network of supply and return piping. It is a highly efficient means of providing locally generated thermal energy for cooling homes, commercial, and institutional buildings, and industrial processes (HOK, pp.7)."
Enforcing minimum building standards	"Energy and water consumption can be addressed on a municipal scale with the implementation of **minimum building standards**. Developing these standards as a regulatory mechanism or an incentive program can help a new community development downsize electric power and water treatment infrastructure in addition to reducing overall consumption (HOK, pp.7)."

Hiring of specialists	"Successful implementation of these Guidelines may require the hiring of specialists at agencies and departments charged with enforcing standards for the Health, Safety and Welfare of Saudi residents (HOK, pp.8)."
Conservation of resources	"Resource conservation is more than an environmental issue; it is a national security issue. Reducing waste in energy and water preserves the resources of the Kingdom. All Saudis should take pride in their stewardship of the Kingdom's prosperity (HOK, pp.8)."
Uniform character of development	"Open space must have a minimum of two pedestrian connections from public sidewalks to make it publicly accessible. Open space must be designed to share the character of the development. It must have paving, walls (screen walls, retaining walls, sign walls, seat walls etc.), and planting materials consistent with the context (HOK, pp.15)."
Rapid commute pathways	"Building within or adjacent to city boundaries enables new residents to enjoy the benefits of a fully built city, without making them waiting years for services to be fully built and available. It shortens their commutes to jobs, schools, places of worship and other destinations. It builds upon existing governance infrastructure and enforcement

	mechanisms. It provides a much more rapid pathway to a higher quality of life (HOK, pp.23)."
Edge development	"Where infill growth is not possible, edge development is preferred to remote suburban and exurban sites. Edge growth is contiguous with existing built development and is able to tie into existing infrastructure while reducing transportation to remote sites (HOK, pp.24)." "New development that occurs at the edge of an existing city or community. Benefits include ability to tie into existing infrastructure, including water, sewer, storm water, electric, telecommunications, transit and roadway network with limited extension required, which may reduce infrastructure costs. May represent a good compromise between the affordability of more remote greenfield development and the desire to reduce sprawl and its associated traffic congestion (HOK, pp.27)."
Priority development programmes	"Municipalities must establish priority zones for development in areas that are capable of achieving the density and diversity recommended in these guidelines. This is

	typically found in or near high density or city center development. This should always be co-located with existing or planned transit infrastructure. The Municipality can help create demand for this property by only leasing or building within priority development areas (i.e. schools, government administrative buildings, housing). If the municipality puts its purchasing power behind it, this creates a significant incentive for land owners to initiate development. In order to support municipal functions and workforce, services, amenities and housing should be encouraged to develop in and around municipal structures (HOK, pp.25)."
Integrating expedited permits	"A land owner seeking a permit for development in a designated priority development zone may receive expedited permitting in order to facilitate the development process and bring the land owner's properties to market sooner than their competition. If the permit is not acted on within 12 months of issue, it should expire. If the project that is permitted is not 50% constructed within 5 years then the permit is

	revoked and the remaining undeveloped land must be re-permitted (HOK, pp.25)."
Infrastructure Investment	"The municipality can encourage more rapid development by investing in the infrastructure in priority development zones, such as providing or improving transit service, sidewalks, landscaping, street lighting, signage, water and sewer, parking and public realm (HOK, pp.25)."
Enforcement of land attrition	"Land in a designated city center or priority development zone that is left vacant will cede a percentage of total land area to the municipality every year that it remains undeveloped until such time as the land owner instigates development through permitting. If the permit is not acted on within 12 months of issue, it should be revoked and attrition reinstated. If the project that is permitted is not 50% constructed within 10 years then the remaining undeveloped land will once more be reduced through attrition (HOK, pp.25)."
Designated share transit routes	"**Shaded Transit/Non-Motorized** only streets are streets that are designed to accommodate only transit and non-motorized

	modes. Examples of designs are shown in the public realm section. Shaded Transit/Non-motorized only streets can vary according to the needed capacity but they should provide ample shade and other amenities and design features to enhance pedestrian walkability. Bicycle accommodation may be included when appropriate (i.e. within Saudi Aramco projects or in school areas) (HOK, pp.41)."
Proposing eco-districts	"A designated zone, area or neighborhood with a commitment to sustainability and environmental performance over time. Such a district may be characterized by bike trails, pedestrian zones, Low Impact Development, green buildings and community scale water, energy, waste and food programs (HOK, pp.49)." "**Smart Growth –** Urban planning approach that focuses growth in compact, walkable areas to limit sprawl and its associated traffic congestion. Smart growth also encourages bicycle-friendly, dense, mixed use, transit oriented development with diverse housing options and amenities. The term 'smart growth' is particularly used in North

	America. In Europe and particularly the UK, the terms ‘Compact City’ or ‘urban intensification’ are also used to describe similar growth patterns (HOK, pp.49)."
Integrating streetscape elements	"Elements like benches, trash receptacles, ash receptacles, and lighting play a role in creating a welcoming experience along pedestrian sidewalks. It is best to strategically place benches along walkways to provide respite from long distances. It is also a good idea to place benches near building entrances and busy retail streets-places where people will like to rest. Trash receptacles and ash receptacles are important parts of successful streetscape designs. Without receptacles, trash and cigarettes are more apt to end up as litter. Receptacles should be placed near seating areas and building entrances. Lastly, lighting is important from a safety and aesthetic standpoint along sidewalks. A well-lit streetscape is not too brightly nor too dimly lit. Successfully lit streetscapes tend to have an even distribution of light rather than hot spots of bright light juxtaposed with gaps of no light (HOK, pp.59)."

Introducing more way-finding signage	"Signage is an important element in the public realm because it helps direct pedestrians, bicyclists and vehicles to destination points. The most effective signage is either mounted on freestanding poles or incorporated into the architecture of adjacent buildings. Site wall signage should generally be avoided in urban areas if not needed for the additional function of retaining earth. Freestanding wall signs tend to take up lots of space which could otherwise be used for pedestrian circulation. The size of the text needs to be thought about as well. The text size needs to be large enough to easily be read when walking up close and at a reasonable distance as well if meant for cars (HOK, pp.60)."
Finding opportunities for district cooling	"Development of a district cooling system requires careful coordination on multiple factors in order to improve efficiency. Water Extraction & Treatment must be developed in innovative ways to obtain and improve water demands and energy consumption. Different chiller plant and system types have different strengths and by careful selection of chiller plant design, these strengths can be

	optimized. Plant configuration is more dependent on the city planning and installation costs than engineering principles (HOK, pp.77)."
Using Life-cycle cost analysis	"It is important to use a life-cycle cost analysis over a 25-year term to determine if a public section energy project is a sound investment. This approach considers the capital costs of each option as well as other costs over an extended period of time, typically 25 years of more. This adds up the capital costs for each option as well as taking other costs in account. Based on the collection of data towards new developments, *DC* | Figure09 below illustrates some of the payback ranges for different system options. In high density urban areas or dense energy zones, district cooling shows the highest rate of return, but only after 10- 15 years. There will need to be long term commitment to the roll-out and development of a district cooling system in order to reap the financial and other benefits (HOK, pp.81)."

Establishing adequate project mix of uses	"A good mix of uses (or load diversity) increases the project's financial viability, and will attract the attention of commercial energy services, investors, and financiers. Mixed-use developments with greater load diversity are more viable than entirely residential developments. Certain buildings, such as hospitals, hotels, large housing complexes, prisons, swimming pools, and ice rinks, as well as military bases and universities, have a large and steady demand for energy over a 24- hour period. Buildings like these also often have space available where energy centers could be placed. Therefore, they make ideal cornerstones for the development of district energy networks, and are known as anchor loads (HOK, pp.83)."
Using thermal energy storage	"The main benefit associated with the use of Thermal Energy Storage has been reduced peak power demand and, therefore, reduced operating energy costs resulting from lower demand charges and/ or lower time-of-use energy charges. Even with 'flat rates' for energy charges, there is real value in the use of TES by energy consumers. The reality is

	that the cost and value of electrical energy varies continuously (based on supply and demand). The variability between day and night is significant, with the incremental power plant costs during peak demand periods in the daytime being far more than the costs during low demand periods at night. The providers of energy continue to realize these variable costs even if they charge their customers a ‘flat rate’ for energy (HOK, pp.96)."
Performing market testing on all projects	"Market testing can be done through a Project Information Memorandum (PIM) that contains a description of the project, plus key documents, such as the technical feasibility study. This market testing provides a chance to adjust the model to make it more attractive to the market. Potential providers can be identified by issuing a Request for Qualifications (RFQ) through an industry clearinghouse to alert regional industry participants of the potential opportunity. This will develop a list of pre-qualified bidders and allow project sponsors to verify projections in the financial model (HOK, pp.100)."

Encourage private development	"**Implementing the guidelines for private development is a straightforward process.** Planning, design and review can essentially take place within a two level process of community scale planning and neighborhood level review. At each level plans and designs should additionally be evaluated as to how well they conform to the guidelines as well as the two basic principles of providing transit access and neighborhood centered design (HOK, pp.116)."
Allowing expedited permits	"Expedited Permitting: A land owner seeking a permit for development in a designated priority development zone or who exceeds initial guidelines may receive expedited permitting in order to facilitate the development process and bring the land owner's properties to market sooner than their competition. If the permit is not acted on within 12 months of issue, it should expire. If the project that is permitted is not 50% constructed within 5 years then the permit is revoked and the remaining undeveloped land must be re-permitted (HOK, pp.117)."

Redefining institutional relations	"Clearly designate responsibilities and grant sufficient authority to enable effective implementation. Consider establish a Metropolitan Planning organization at a level between cities and provinces and tasked with integrating transportation, land use, housing and economic development planning. Evaluate the location of land use control authority. Enforce coordination between agencies – including power and water, transport, housing, environment, industry/energy (HOK, pp.118)."
Upgrading local buildings	"Upgrading the energy efficiency of residential buildings is very cost effective. A recent study estimated that upgrading the energy efficiency of a typical new home to comply with the model energy code in Nevada would cost about $1,500US on average but would result in about $400US in annual energy bill savings, meaning a simple payback of less than four years (HOK, pp.126)."

Conclusion of Analysis

There is need for urban policies to reflect several aspects of development, starting from the economy, which form the basic foundation for other important aspects of development. In this respect, there is need for emphasis on addressing the current situation in the city to make it align with the future vision of the economy of the city. The city should also focus on gradual improvements, rather than dependence on the public sector as one of its main financiers, by motivating the private sector to take on bigger roles in driving the improvements in the city, and in enabling it to attain better standards of living for its citizens (SEEP, 2013).

At all levels, it is important for the municipalities to come together and work to identify any priority development areas, that are included but not specific to any local transit areas, edge communities, and urban infill sites. Any arrangements between the municipalities should be arranged such that any development plans are held to specific standards of quality across the entire region in question. Every major municipality should also designate a specific sustainability coordinator or director for the purpose of communicating across several municipalities. These individuals should also be conversant in both land use and sustainable development. Any other Municipal Sustainability Committee formed sing representatives from each municipality should also be formed, and should hold regular meetings for the purpose of integrating any regional plans for development and improvement (UNHABITAT, 2016).

Outline 6: Propose a sustainable urbanisation framework capable of being integrated into the future development of urban areas within SA.

Themes	**Quotation from Government Files**	**Opinion for analysis in line with objective and research question**
Understanding community expectations	"...policies and the national,regional plans will come as support for the strategies and local expectations on the future vision for Arriyadh city (ADA, 2010, pp.40)."	The city administrators should find ways of connecting the future vision of the city with local plans

		in line with community expectations.
Vertical expansion of the city	"...linkthese sub-centers with the existing city center through activity spines of higher densitiesto serve wider areas located between the centers and the city. This provides opportunitiesfor vertical expansion instead of horizontal (ADA, 2010, pp.40)."	Vertical expansion of the city will enhance effective interlinks of different parts with each other through the use of the roads and boulevards, thereby establishing an effective transportation networks at all city levels.
Proper policy translation	"The policies andcontrols will translate the vision, in these suburbs through changing the network patternsprevailing in the city and give chance to contemporary innovations and planningarchitectural patterns based on the presumption that the private sector will be responsiblefor its implementation with less government intervention (ADA, 2010, pp.40)."	This will enhance the creation of innovative and competitive atmospheres that are capable of adjusting to any new concepts and ideas for improving the standards of living in the city.
Exploitation of competitive advantages	"The utilization of the competitive advantages of Arriyadh city as a governmental,economic, social and scientific center will support the activity sectors and ensure theirdistinction... (ADA, 2010, pp.41)."	Competitive advantages are elements that will foster the future urban development to compete with several other local, regional and international areas.
Exploitation of available economic potentials	"The increase of the private sector contribution in the city development, as a result ofexpected decrease of government investments in the city, will encourage innovations andlook for advanced means and ways to finance the urban development processes (ADA, 2010, pp.41)."	This should involve the study of critical issues, and the use of the vision that formed the basis for the development of a stronger strategic framework.

Diversification of economic base	"...diversification of the city economic base: through definition of the promising sectors,which generate new job opportunities, income for the sale of exports, replacement of import, investment of savings in the local economy and encouragement of the exportof activities and services in the economic sectors (ADA, 2010, pp.46)."	This should involve the integration of sectors such as, advanced technology, information from traditional industries, financial aspects, health, education, communication technology, and tourist attraction sites and services.
Establishment of youth training	"Establishment of youth training centres which provide the youth with basic vocational and technical skills to qualify them for the available jobs, in coordination with the current vocational education institutions, focusing on practical application (ADA, 2010, pp.47)."	This can be established using support from local charity foundations, schools, business boards and financial aids.
Increased incentives to local companies	"Recommending a Saudization program, to give incentives to the companies and theorganizations which increase the percentage of Saudis they employ (ADA, 2010, pp.47)."	The city should give clarity in investment policies and regulations, their uniformity and stability in establishing a competitive economy in line with international standards.
Enhanced women training	"Set up programs for women training within the Islamic frameworks, that is acceptableto the community(ADA, 2010, pp.47)."	This should lead to the development of business centers for women companies.
Regulation of mining activities	"Enforcement of conditions and measures regarding mining activities in areas assigned for those activities in accordance with the environmental basis (ADA, 2010, pp.55)."	This is for the purpose of avoiding the negative impacts of mining on the natural environment, and its surrounding urban areas.

Considerations for geological characteristics	"Taking into consideration the climatic conditions of high temperature and low humidity, low rainfall and prevailing north and south winds in the urban planning and designing process (ADA, 2010, pp.56)."	This encourages the employment of controls and the taking of necessary steps in the curbing of pollution on the inhabitants of the city and its environs.
Preservation of wildlife	"Preservation of natural wildlife, historic and heritage locations and the beauty of natural scenery, important as resources for recreational and tourist purposes and scenic values for the city image (ADA, 2010, pp.56)."	Preserving wildlife discourages any negative effects on the natural environment and its surrounding urban areas.

Themes	**Quotations from Government files**
Integrating desalination systems	"Energy is also a key input to the water value chain, used to power water movement and treatment. Energy is consumed to deliver water, from basic mechanical systems that bring groundwater to the surface so it can be conveyed to homes and businesses to more complex desalination systems designed to convert seawater into potable water (HOK, pp.7)."
Training of existing staff	"In addition to specialists, existing staff should be trained over time to include sustainability in their enforcement processes. Third party consultants or certifiers may help

	with enforcement/ verification while the Kingdom builds capacity (HOK, pp.8)."
Strategic location of future projects	"One of the single most critical decisions that can be made to protect the vision of a sustainable Kingdom is the location of future development. When construction occurs in disparate locations across the Kingdom landscape without respect to transportation, infrastructure or redevelopment plans, it can exacerbate sprawl issues and increase the overall fuel consumption of the Kingdom not just per capita, but nationally as the population increases (HOK, pp.10)." "One of the single most critical decisions that can be made to protect the vision of a sustainable Kingdom is the location of future development. When construction occurs in disparate locations across the Kingdom landscape without respect to transportation, infrastructure or redevelopment plans, it can exacerbate sprawl issues and increase the overall fuel consumption of the Kingdom not just per capita, but nationally as the population increases (HOK, pp.23)."

Establishing guidelines for neighbourhood building blocks	"The neighborhood type building blocks, which comprise a unified set of guidelines for each neighborhood type, are combined to create the overall community mix guidelines for different scales of community. For new communities planned in the near future, Criteria A of the guidelines recommend a mix that phases in the change from automobile-oriented low- and mid-density predominance. Criteria B of the guidelines are more ambitious in recommending more downtown and city center development (HOK, pp.14)."
Eradication of safety hazards for pedestrians	"Limit abrupt changes in elevation along a path. The pathway must be kept in good repair with no safety hazards for pedestrians. The pathway must have no steps, curbs, steep ramps, potholes, or building projections (HOK, pp.14)."
Upgrading existing infrastructure	"Existing cities have infrastructure including transport, electricity, water and sewer. Many cities can afford to increase their density within existing development boundaries, which allows existing infrastructure to be upgraded rather than replicated across the region and the Kingdom. This is by far a more economical approach to development,

	even before the fuel savings are accounting for (HOK, pp.23)."
Establishing urban redevelopment projects	"Infill Sites: Wherever possible, new growth should occur within existing urban areas, relying on existing infrastructure and reducing transportation to remote sites outside of the urban area. Existing infrastructure can and should be improved as needed to handle the new demand. Redevelopment projects are a great opportunity to create dense, mixed use and transit oriented development in the heart of an existing city, such as Riyadh. Urban redevelopment projects typically become valuable and sought after property due to their proximity to amenities and services within the city, high visibility, and improved quality of life. Many underdeveloped or underutilized sites may be available for redevelopment (HOK, pp.23)."
Introducing land incentives	"Land in a designated city center or priority development zone should see property values rise as the municipality focuses on Transit Oriented Development and infill. In addition to higher property values, the municipality

	may offer development grants or rebates to support the financial feasibility of development. By raising the value of the land or reducing the payback period, the economic proposition of developing a parcel of land becomes more viable (HOK, pp.25)."
Providing numerous public amenities	"Land in a designated city center or priority development zone that is left vacant must be transformed into an urban park or other public amenity space until such time as the land owner instigates development. The land owner would be responsible for building, maintaining and operating the public park or amenity space until a permit for development has been approved by the municipality. If the permit is not acted on within 12 months of issue, it should be revoked and the requirement for public amenity reinstated. If the project that is permitted is not 50% constructed within 5 years then the permit is revoked and the remaining undeveloped land must be turned into a public park or amenity space once more (HOK, pp.25)."
Introducing land vacancy fines	"Land in a designated city center or priority development zone that is left vacant will

	incur a monetary fine based on square meter of undeveloped land until such time as the land owner instigates development through permitting. If the permit is not acted on within 12 months of issue, it should be revoked and the vacancy fine reinstated. If the project that is permitted is not 50% constructed within 5 years then the permit is revoked and the remaining undeveloped land will once more incur a vacancy fine based on square meters of remaining undeveloped land (HOK, pp.25)."
Proposal of neighbourhood centric designs	"The second principle behind Transit Oriented Development is that development should consist of a mosaic of neighborhoods each of which is partially self-contained. Market driven local services and transit options should be available within walking distance of all households. Even if residents do not choose to walk, the decreased distances can lead to shorter vehicle trips (HOK, pp.25)."
Establishing transit corridors	"Is defined as the walkable areas around all of the stations along a transit line. Different

	transit technologies will define different areas of influence (HOK, pp.27)."
More transit oriented development	The integration of land use and transportation planning so that development around a transit station facilitates and encourages non-motorized travel. TOD includes road design features that make walking and cycling easier and safer. Mixed-use development is often included in order to provide a range of amenities such as shops, services, schools, and housing within a short walking distance. In order to lessen walking distances, high density development is located closest to transit access. Rather than providing non-automobile access to 100% of an urban area, TOD provides an alternative option for those who choose not to use a car. In addition to reducing the length of trips by putting amenities closer together, TOD reduces the number of trips that people choose to travel by private automobile—reducing congestion, fuel use and carbon emissions (HOK, pp.27)." "**Transit Station:** is a passenger station for vehicular, and/or rail mass transit systems. Terminal facilities providing maintenance and

	service for the vehicles operated in the transit system which includes buses, taxis, railway, etc (HOK, pp.27)."
Establishing multi-use buildings	"**Mixed-use** is walkable development focused around multi-level buildings that combine more than one use—often retail on the ground-floor and residential and/or office space on the upper-levels. The percentage of mixed use is calculated by determining the fraction of buildings which are designed to allow commercial or other uses and residential uses at the same time. In some cases it may be permissible to designate a single property as mixed use if it contains two or more single use buildings of commercial and residential on the same parcel (HOK, pp.41)."
Controlled suburban sprawl	"The unmitigated expansion of low-density and auto-dependent development, typically on rural land, also called 'green field' sites. Sprawl is typically caused by lower land costs farther from urban centers, but the low cost of land is countered by the high cost of extending infrastructure to far flung developments, sometimes born by the

	developer and sometimes by the local government. The increased dependency on vehicles also creates other downstream effects, such as increased roadway maintenance, poorer local air quality from vehicle emissions, and a greater percentage of homeowners' incomes being allocated for transportation instead of food, shelter or other necessities (HOK, pp.41)."
Municipal landscaping	"In order to promote walkability (during the appropriate times of year and times of day) it is important to provide a comfortable microclimate. This can be accomplished through municipal landscaping and street trees, as well as other shading devices. This will require irrigation, but can be designed to a water budget informed by the available Reclaim Water. In addition, in order to provide a comfortable microclimate for leisure, sports, walking, bicycling, and other activities, it is important to introduce vegetation into the landscape. Street trees, for example, can provide much-needed shade and cooling for a pedestrian. In order to reduce fuel consumption in the Kingdom, it is

	critical to reduce motorized transportation (HOK, pp.52)."
Enforcing minimum open spaces	"All successful land developments incorporate open space as a key element. Open space comes in many forms- parks, playgrounds, plazas, sikkas, recreation areas, drainage areas, and buffer zones. Recent sustainable land developments in Saudi Arabia such as KAPSARC, Jebel Heights, and South Dhahran Housing District, all work open space ideas as central elements to their design. Although the exact percentages of open space differ per plan, a good minimum benchmark to use in new developments is 10% of all land area should be devoted to open space. These spaces should all be publicly accessible and ideally incorporated into the plan in such a way that they are visible and part of the character of the overall development (HOK, pp.54)."
Strategic location of amenities	"A good land plan will consider how closely amenities are located to homes. A good rule of thumb in hot desert environments such as Saudi Arabia, is that amenities with close neighborhood ties should be located within a

	brief five minute walk from all homes. These types of neighborhood amenities include schools, mosques, neighborhood parks, local neighborhood commercial centers, and playgrounds. This is not because everyone is expected to walk to them every time they want to use them, but it gives someone the option to do so if they feel like it or if it happens to be a cooler part of the day. If they do happen to drive to a neighborhood amenity, by locating it closer, at least the total vehicle miles travelled is reduced. Community wide amenities like retail shops, libraries, restaurants, and food markets can be located at a farther distance from homes, but still an easy walk. This still keeps the amenities close enough to walk or bike to during the cooler part of the day if someone is willing to travel a little farther (HOK, pp.55)."
Controlling microclimate	"Microclimate is another factor that contributes to walkability. Microclimate refers to a localized zone where the climate differs from the surrounding area. In the case of pedestrian zones, it's the desire to create

	walking paths that are shaded and feel cool. This can be accomplished in a number of ways. One way this can be accomplished is through the use of vegetation. A more effective way is by utilizing shade from built elements like buildings, walls, or canopies. These built structures do not need irrigation or maintenance like vegetation. Even using walkway materials that are light in color and have a high reflective value helps in cooling the immediate environment (HOK, pp.55)."
Establishing tree canopies	"Providing a healthy tree canopy within a development does a number of positive things from a sustainability standpoint. Trees need relatively little irrigation water when compared to turf grass. They also shade the surrounding environment. On a grand scale this has an effect on building energy use and the ambient temperature of the public realm. Trees also have a way of bringing life and character to a neighborhood. The sound of wind passing through palm fronds, the smell of flowers, and the various shades of green reinforce the importance of nature within the built environment (HOK, pp.56)."

Establishing special purpose routes	"In a hybrid/special purpose vehicles route, municipalities may have the option to establish a special purpose entity such as a Project Partnership or a Limited Liability Corporation (LLC) that will establish a separate functional organization with a distinct charter, and may include shareholder definitions and financial records. If this route is chosen, the services of a specialist lawyer will be required to draw up the documentation to establish the organization. If the plans include a public authority, it will still have to comply with relevant public bidding and procurement procedures and the process laid out above (HOK, pp.100)."
Comprehensive delivery plan	"The delivery plan must include key milestones set in the final contract. It is advisable to appoint a contracts supervision officer to provide a focus point between the two parties, oversee the delivery of the contract, and deal with any problems that may arise. Additionally, project delivery will involve permits, rights of way, traffic planning, and street construction disruption, and it will be appropriate to appoint a

	community-relations or resident-relations officer (HOK, pp.100)."

Conclusion of Analysis

In addition to any of the above mentioned determinants, there is need to take into account any man-made determinants, such as, the main sources of environmental pollution. This can be done through several controls, and the taking of steps to limit any negative environmental effects. Of these measures should entail: the limitation of industrial growth and waste disposal, proposals to provide any necessary facilities in environmental reforms, establishment of reform plans to integrate new technology and control future risks, establish a control and monitoring systems in grossly affected areas of the city (UNHABITAT, 2016).

At all local levels, it is crucial for municipalities to reevaluate their current plans to approve consistency with any sustainable development guidelines. For instance, the High Commission for development in Riyadh will be forced to se funded and well planned transit corridors to aid any other developers in finding more suitable transit oriented projects. Also, the commission will have the responsibility of selecting the most suitable of any other recommended strategies for facilitating infill projects in areas with underdeveloped urban lands. similarly, considerations should also be made to include the assessment of current areas that have been flagged for development and benchmarking their diversity, density, and other land use assumptions that could go against any sustainable urban planning guidelines, and in coming up with the most suitable locations for projects based on district cooling hubs. This should be done with regard to any municipality minimum building performance criteria for energy and water use in order to properly gauge infrastructure (HOK, 2013).

Bibliography

Arriyadh Development Authority – ADA. (nod.).*Metropolitan Development Strategy for Arriyadh (MEDSTAR): The Comprehensive Summary Report*. Riyadh: ADA

HOK, H. O. (2013). *Sustainable Planning Guidelines for Urban Growth in the Kingdom of Saudi Arabia*. 1-100.

Renaud, B. (2016). *Urban Dimensions of Sustainability and City Resilience*. Riyadh: Saudi Ministry of Municipal and Rural Affairs & UN HABITAT

Saudi Energy Efficiency Program – SEEP. (2013). *Sustainable Planning Guidelines for Urban Growth in the Kingdom of Saudi Arabia*. Riyadh: Hellmuth, Obata + Kassabaum Architects (HOK)

UN Department of Economic and Social Affairs – UNDESA. (2012). *Challenges and Way Forward in the Urban Sector: Sustainable Development in the 21st Century (SD21).* Geneva: UNDESA

UNHABITAT. (2016). *Review and Evaluation of Urban Planning Legislation in Saudi Arabia*. Nairobi: UNHABIT

APPENDIX E: Summary of findings for all groups (Main Fieldwork study)

Summary of findings of Riyadh Residents (G-R)

Table 1: Summary of findings on barriers to sustainable urbanisation

	Barrier	How barrier manifests itself	Cause(s) of barrier	Resultant effect(s)
1.	Environmental degradation	▪ Air pollution	▪ Exhaust fumes from cars; ▪ Industrial waste from chemical and cement industries ▪	▪ Poor air quality ▪ Respiratory diseases
		▪ Poor waste disposal	▪ Continued use of landfills ▪ Increased urban population	▪ Harmful gas emissions ▪ Increased municipal waste
		▪ Water resource depletion	▪ Increased urban population ▪ High demand for water resources	▪ Inadequate water supply
		▪ Noise pollution	▪ Increased traffic on roads	▪ Lack of serenity
2.	Haphazard urbanisation	▪ Poor spatial distribution	▪ Poor land use strategies ▪ Skewed distribution of public facilities	▪ Unequal distribution of resources ▪ Poor service delivery
		▪ High demand for housing	▪ Increased urban population	▪ Strain on public service facilities ▪ Use of poor building materials ▪ Unplanned settlements ▪ Low-quality housing

Table 2: Summary of findings on the drivers of sustainable urbanisation

	Driver	How driver manifests itself	Causes	Effects of driver
1.	Financial resources	▪ Increase in government finances ▪ Improvement in living conditions	▪ The oil boom (exportation of oil)	▪ Ability to finance development projects ▪ Increase in job opportunities
2.	International migrants	▪ Presence of foreign workforce ▪ Increase in number of villas	▪ Presence of job opportunities in Riyadh	▪ Provision of expertise and experience in sustainable urbanisation
3.	Economic boom	▪ Increased GDP ▪ Economic growth	▪ The oil boom (exportation of oil)	▪ Financing of sustainable development projects ▪ Increased job opportunities ▪ Improved living conditions

Table 3: Summary of findings on improving the quality of life

	Factor	How factor manifests itself	Effects on quality of life
1.	Equitable distribution of resources	▪ Equal distribution of public infrastructures	▪ Everyone is able to access public infrastructures e.g. recreational facilities, roads etc.
		▪ Equal distribution of basic necessities	▪ Everyone is able to afford food ▪ Everyone is able to acquire education and health
		▪ Social equality	▪ Women are offered the same opportunities as men as far as jobs and political participation is concerned
2.	Better housing	▪ Sustainable housing ▪ Affordable housing ▪ High quality housing with sanitation facilities	▪ Improved living conditions for all residents ▪ Reduced shortfall of housing facilities ▪ Decrease in the number of unplanned settlements
3.	Increased job opportunities	▪ Increased sustainable development projects ▪ Job creation policies e.g. the *Saudization* policy	▪ Reduced unemployment rate ▪ Reduced income inequality ▪ Reduced frustration among jobless youth ▪ Increased in taxes collected

			▪ Improved standard of living for employed youth
4.	Better urbanisation policies	▪ Sustainable urban planning policies	▪ Better implementation of policies ▪ Implementation of sustainable urbanisation policies
		▪ Better land use policies	▪ Improved land use ▪ Improved urban planning ▪ Improved spatial distribution
		▪ Explicit urban planning policies	▪ Better understanding of the roles of the municipality officials ▪ Improved coordination between agencies and officials charged with urban planning ▪ Increased community involvement in urban projects

Table 4: Summary of findings on environmental, social and historical factors affecting sustainable urbanisation

	Factor	**How factor manifests itself**	**Effects on sustainable urbanisation**
1.	Environmental factors	▪ Climatic conditions	▪ Reduced rainfall and droughts ▪ Occurrence of natural hazards e.g. flooding ▪
		▪ Increased pollution	▪ Increased air pollution ▪ Natural resource depletion
2.	Social factors	▪ Changing demographic composition	▪ Increased number of youth ▪ The ethnic composition of Riyadh is changing
		▪ Community involvement	▪ Increased public awareness of sustainability practices ▪ Public involvement in monitoring of urban development projects ▪ Increased engagement between the government officials and the public in policy making
		▪ Migration	▪ Increased proportion of foreigners in Riyadh ▪ Increased urban population due to rural-urban migration
		▪ Increased urban population	▪ Strain on public infrastructure ▪ Increased environmental degradation

			▪ Increased urban sprawl ▪ Increased demand for housing
		▪ Changing lifestyles	▪ Modern forms of housing with increased privacy ▪ Increased pollution due to increased ownership of cars
3.	Historical factors	▪ Historical sites ▪ Past urbanisation processes	▪ Copying of Islamic architecture in sustainable housing ▪ Avoidance of mistakes associated with past urbanisation processes ▪ Preservation of historical sites

Table 5: Summary of findings on the impact of rapid urbanisation on desert and arid lands

	Impact	**Cause of impact(s)**	**Effect on sustainable urban planning**
1.	Increased urban population	▪ Rural-urban migrants ▪ International migrants ▪ Improved fertility rates	▪ Increased traffic congestion ▪ Shortfall in housing ▪ Strained public infrastructures ▪ Increased municipal waste ▪ Increased demand for housing
2.	Environmental degradation	▪ Depletion of water resources	▪ Water scarcity
		▪ Increased pollution of air, soil and noise	▪ Poor air quality due to increased emission of noxious fumes by cars
		▪ Increased municipal waste from residential areas and industries	▪ Poor waste disposal due to increased workload
3.	Changes in land use	▪ Increased residential buildings	▪ Expansion of urban boundaries of Riyadh ▪ Inadequacy of land ▪ Reduced availability of open space and recreational parks ▪ Increase of modern buildings e.g. villas
		▪ Land reclamation	▪ Conversion of Wadi Hanifa into a tourist attraction

Table 6: Summary of findings on the challenges in planning for sustainable urbanisation

	Challenge	**Cause of challenge**	**Effect of challenge on sustainable urban planning**
1.	Poor departmental cohesion	▪ Lack of clear and defined roles ▪ Lack of expertise	▪ Poor service delivery ▪ Poor implementation of policies and regulations

		▪ Lack of independence	▪ Increased urban sprawl
2.	Inadequate public facilities/services	▪ Increased population due to migration ▪ Haphazard urbanisation	▪ Incessant traffic jams ▪ Strained public infrastructures ▪ Inadequate recreational facilities and open spaces ▪ Congested road transport network
3.	Lack of citizen participation	▪ Lack of information sharing ▪ Poor engagement between government and the public	▪ Low public awareness about sustainable urbanisation ▪ Poor delivery of services ▪ Lack of adequate private sector investment

Table 7: Summary of findings on integration of sustainable urbanisation into future development

	Activity	**How to implement activity**	**Effect of activity on sustainable urbanisation**
1.	Increased citizen participation	▪ Improved information sharing by the municipality ▪ Establishment of an accessible database e.g. e-government ▪ Use of media forums to communicate public concerns e.g. social media ▪ Traditional forums and meetings between the municipality officials and members of the public	▪ Increased engagement between the government and the public ▪ Improved monitoring of development projects by the public ▪ Increased involvement by public in policymaking processes ▪ Increased accountability by government departments and municipalities regarding sustainability of development projects
2.	Sustainable urbanisation policies	▪ Updated urbanisation policies ▪ Water management policies ▪ Anti-pollution policies e.g. the imposition of heavy fines against those	▪ Relevant policies to effective guide the process of sustainable urbanisation e.g. sustainable housing ▪ Protection of water resources e.g. groundwater resources ▪ Reduced pollution

		who pollute the environment ▪ Natural resource management policies	▪ Conservation of natural resources e.g. natural deserts and wildlife parks

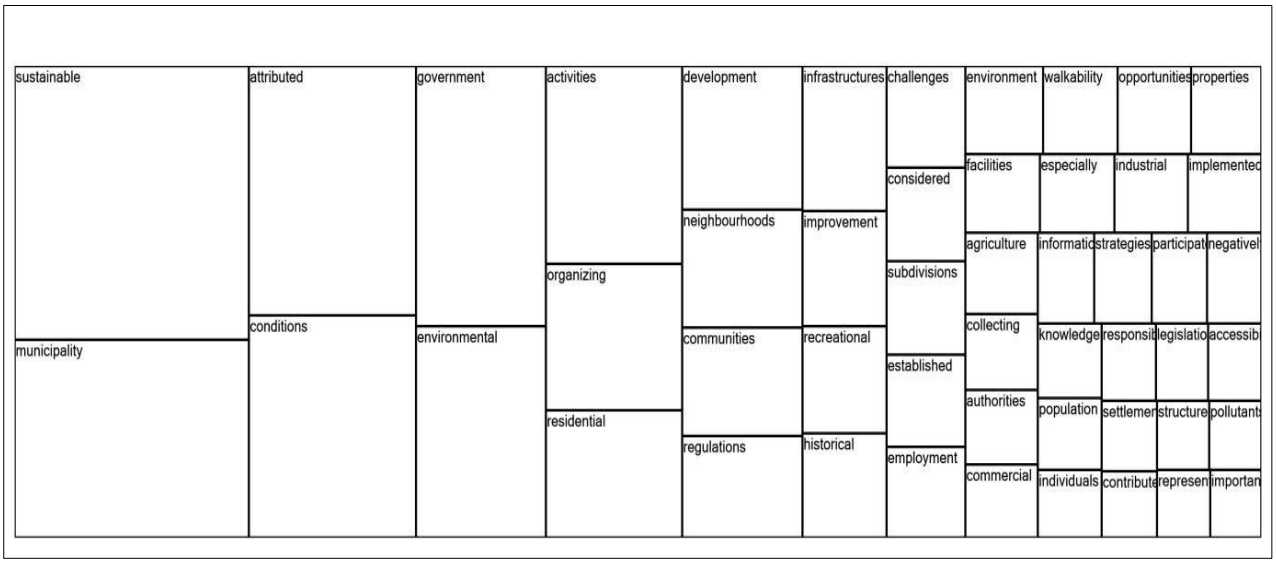


Fig. 1: Word frequency queries for all themes

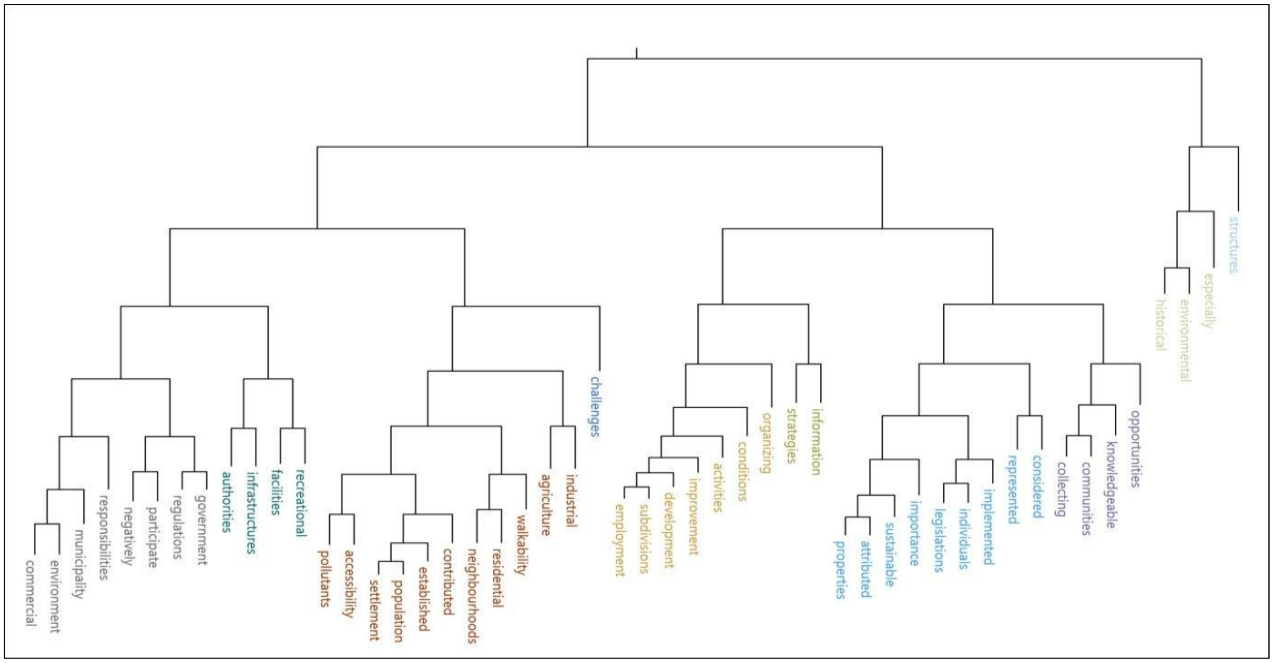


Fig. 2: Word frequency queries of tree map for all themes

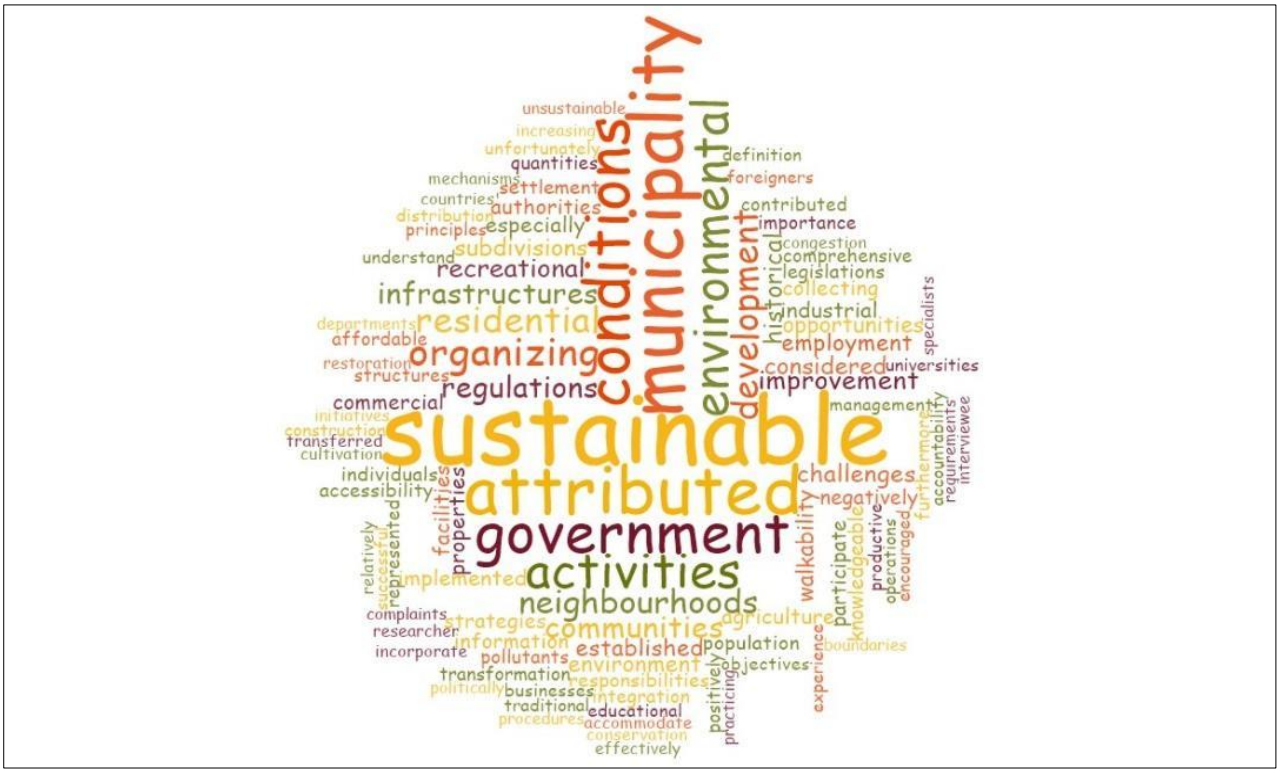


Fig 3: Word frequency queries of word cloud for all themes

Summary of findings (Government Representatives) Experts (G-E)

Table 8: Summary of findings on barriers to sustainable urbanisation

	Barrier	Cause(s) of barrier	Resultant effects on urban planning
1.	Poor community participation	▪ Poor engagement between the government and the people ▪ Lack of access to information from the government ▪ Low levels of public awareness about sustainable practices	▪ Disinterest by public in adopting sustainable practices ▪ Lack of public monitoring or supervising of development projects
2.	Outdated urban planning policies	▪ Lack of expertise and knowledge on sustainable urban planning ▪ Lack of inclusive process of policy formulation	▪ Unclear roles of municipality officials and agencies in urban planning ▪ Poor implementation of urban planning e.g. waste management ▪ Outdated ways of urban planning ▪ Increased urban sprawl

3.	Poor government supervision	▪ Lack of concrete regulations and legislative framework to guide urban planning ▪ Lack of powers for municipal councils to supervise urban development projects	▪ Haphazard urbanisation ▪ Flouting of urban planning policies e.g. the building codes

Table 9: Summary of findings on drivers of sustainable urbanisation

	Driver	Causes of driver	Effects of driver on urban planning
1.	Economic boom	▪ Oil revenues (exportation of oil) ▪	▪ Provision of financial resources for the implementation of sustainable urban projects
2.	Political will	▪ Existence of a youthful leadership among the Royal family ▪ Recognition of the need for change to take Riyadh to the next level	▪ Formulation of policies and strategies to actualise sustainable urbanisation e.g. NTP 2020 and Saudi Vision 2030 ▪ Continuous engagement between the government and the public/local community

Table 10: Summary of findings on improving quality of life

	Factor	How factor manifests itself	Effects on quality of life
1.	Better urbanisation policies	▪ Relevant policies concerning the needs of the community ▪ Updated policies on sustainable urbanisation ▪ Flexible policies to address emerging problems related to urbanisation ▪ Policies that create gender equality	▪ Better implementation of sustainable urban planning ▪ Creation of job opportunities for the youth ▪ Increased public participation in sustainable urban planning ▪ Improved land use

			▪ Improved environmental management ▪ Equitable distribution of resources ▪ Enhanced opportunities for women
2.	Better environmental management	▪ Adoption of renewable energy ▪ Modern waste management methods ▪ Construction of recreational facilities, open spaces and green spaces	▪ Preservation of natural resources ▪ Reduction of municipal waste ▪ Reduction of air pollution ▪ Increased walkability in residential areas as well as in the city centre
3.	Improved public services	▪ Development of public transport system ▪ Upgrading and provision of adequate health and education facilities ▪ Equitable distribution to basic public facilities e.g. health and education	▪ Reduced traffic congestion due to reduced numbers of cars on the roads ▪ Universal access to health and education facilities ▪ Improved health status and education levels ▪ Reduced pollution associated with emission of fossil fuels ▪ Reduced costs associated with consumption of fossil fuels

Table 11: Summary of the findings on environmental, historical and social factors affecting sustainable urbanisation

	Factor	**How factor manifests itself**	**Effect on sustainable urbanisation**
1.	Social factor	Public awareness	▪ An enlightened public on matters sustainable urbanisation ▪ Increased public participation in

			monitoring urban development projects ▪ An enlightened and empowered municipality officials efficient at their roles and responsibilities
		Increased urban population	▪ Increased urban sprawl ▪ Rise in house rents ▪ Increased demand for housing ▪ Increased traffic congestion ▪
2.	Environmental factors	Environmental conservation	▪ Protection of natural resources e.g. wildlife parks ▪ Proper waste management practices
		Water resource management	▪ Preservation of groundwater resources ▪ Increase in water supply ▪ Balance between water demand and water supply
3.	Historical factors	Islamic architecture	▪ Phasing out of Islamic architecture in favour of modern buildings ▪ Increased privacy unlike old neighbourhoods where families could share a veranda

Table 12: Summary of findings on the challenges in planning for sustainable urbanisation

	Challenge	**How challenge manifests itself**	**Effect on sustainable urban planning**
1.	Outdated urbanisation policies	Policies that overemphasise on residential planning than other aspects of land use e.g. REDF	Poor urban planning that increases urban sprawl

2.	Rapid population growth	▪ Reduction in amount of land available ▪ Increase in the prices of land ▪ Increased demand for houses ▪ Increased number of international migrants	▪ Increase in the number of modern houses targeting international migrants e.g. villas ▪ Increased prices of houses ▪ Increased urban sprawl ▪ Strain on public infrastructure e.g. roads
3.	Lack of coordination among government officials	▪ Duplication of roles or activities by different agencies ▪ Poor communication between different agencies and municipality	▪ Disjointed urban planning process ▪

Table 13: Summary of findings on the impact of rapid urbanisation on desert and arid lands

	Impact	**Cause of impact**	**Effect on desert and arid land**
1.	Natural hazards	▪ Climate change ▪ Poor land use ▪ Adverse weather conditions	▪ Occasional flooding ▪ Drought ▪ Environmental degradation ▪ Reduction of soil quality
2.	Increased pollution	▪ Increased urban population ▪ Increased urban sprawl ▪ Increased traffic congestion ▪ Increased number of chemical and cement industries	▪ Reduced air quality ▪ Reduced soil quality ▪ Increased emission of harmful gases
3.	Land reclamation	▪ Increasing demand for land for residential and commercial purposes ▪ Rapid population growth	▪ Changed landscape of the desert and arid lands ▪ Increase in the number of modern buildings

Table 14: Summary of findings on integration of sustainable urbanisation in future development

	Strategy	How to implement strategy	Effect on sustainable urbanisation
1.	Better urban planning strategies	▪ Inclusive process of policy formulation ▪ Evidence-based policy making process	▪ Increased public-private sector partnership ▪ Relevant policies related to waste management, environmental management and distribution of resources etc. ▪ Improved coordination between various government agencies and municipality officials ▪ Better supervision of urban development projects ▪ An orderly urbanisation process
2.	Increased community involvement	▪ Municipal council meetings with the public to deliberate various policies ▪ Enhanced access to information on various policies as well as urban projects ▪ Awareness programmes on sustainability practices	▪ Adoption of sustainability practices by members of the public at an individual level ▪ Increased cooperation between the government and the public in monitoring urban development projects ▪ Formulation of relevant policies that cater to the needs and concerns of the community

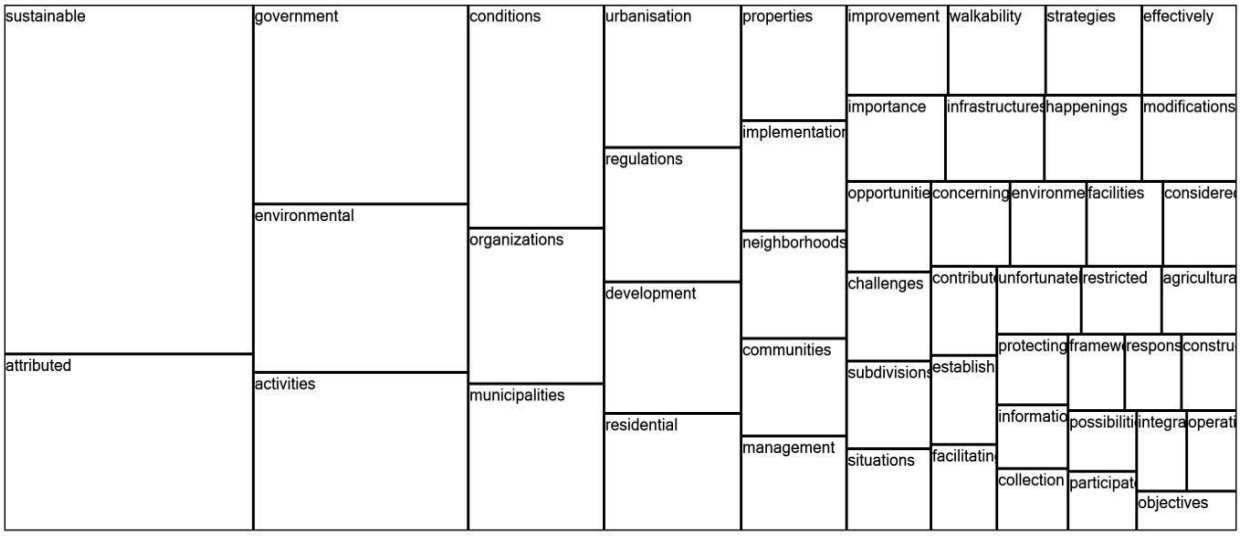


Fig. 4: Word frequency queries for all themes.

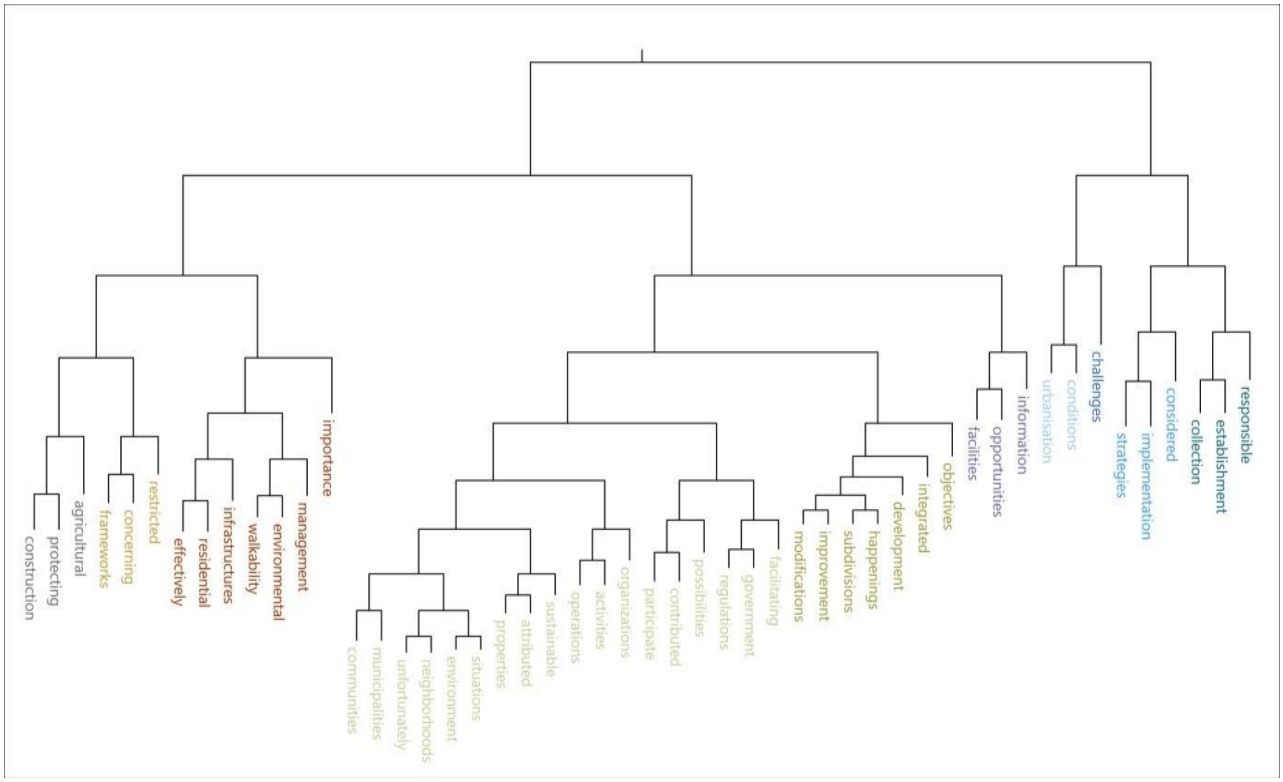


Fig. 5: Word frequency queries of tree map for all themes

Fig 6: Word frequency queries of word cloud for all themes

Summary of findings (Academics/researchers Group) (G-A)

Table 15: Summary of findings on barriers to sustainable urbanisation (Experts and Researchers)

	Barrier	Cause of barrier	Effect on sustainable urbanisation
1.	Poor government interventions	▪ Inefficient government structure ▪ Outdated policies and guidelines on urban planning ▪ Lack of expertise among central government officials and regional authorities ▪	▪ Increased urban sprawl ▪ Lack of community involvement in sustainable urban planning and implementation ▪ Poor delivery of public services by regional authorities and central government ▪ Low levels of investments by the private sector
2.	Poor urban planning	▪ Outdated policies and guidelines on urban planning ▪ Lack of coordination among stakeholders of	▪ Increased urban sprawl ▪ Increased environmental degradation

		sustainable urban planning ▪ Lack of knowledge and skills on sustainable urban planning	▪ Increased social and spatial inequality ▪ Increased traffic congestion ▪ Inadequate recreation facilities and green spaces

Table 16: Summary of findings on the drivers of sustainable urbanisation (Experts and Researchers)

	Drivers	How driver manifests itself	Effect on sustainable urbanisation
1.	Government involvement	▪ Preparation of economic development strategies and programmes (e.g. NTP 2020; Saudi Vision 2030) ▪ Facilitation of dialogue and discussions among various stakeholders of sustainable urban planning ▪ Development of policies and guidelines to outline the process of sustainable urbanisation ▪ Provision of financial resources for the realisation of sustainable urbanisation objectives	▪ Increased public participation in adoption of sustainability practices ▪ Greater coordination and collaboration among stakeholders of sustainable urban planning ▪ Better implementation of the objectives of sustainable urban planning according to the different economic plans and strategies (e.g. NTP 2020, Saudi Vision 2030) ▪ Increased private sector investment

Table 17: Summary of findings on improving the quality of life (Experts and researchers)

	Factor	Causes of factor	Effects on quality of life
1.	Improved social conditions	– Increased use of renewable energy sources – Increased employment opportunities – Equal distribution of resources	– Reduced cost of living due to affordable housing and increased employment – Reduced risk of social ills (e.g.

		– Provision of affordable housing	crime, violence and radicalisation) – Equal access to resources – Reduced social and spatial inequalities
2.	Improved government involvement	– Policies and programmes to increase job opportunities – Facilitating adoption of smart technologies for sustainable housing – Improved distribution of resources – Restructuring of the governance structure	– Increased job opportunities – Availability of affordable housing – Equal access to resources for all residents – Improved coordination among stakeholders of sustainable urbanisation – Improved implementation urban planning policies and guidelines

Table 18: Summary of findings on the environmental, social and historical factors affecting sustainable urbanisation

	Factor	**How factor manifests itself**	**Effect on sustainable urbanisation**
1	Social factors	Social inequality e.g. – Unequal distribution of public infrastructures – Gender inequality	– Failure of residents to adopt sustainability practices – Low levels of women participation in sustainable urban planning – Increased risk of crime, violence and radicalisation of unemployed youth
2.	Environmental factors	– Poor waste management – Poor environmental conservation – Poor water resource management – Low adoption of renewable energy	– Increased levels of municipal and industrial waste – Increased water scarcity and high demand for water

		sources (e.g. solar power and wind power)	– Increased pollution due to dependence on fossil fuels – Increased long-term costs of overconsumption of fossil fuels
3.	Historical factors	Past urbanisation processes e.g. – Haphazard urbanisation – Lack of flexible policies and guidelines on urban planning and implementation – Use of foreign companies in preparing master plans for the city	– Meticulous urban planning process by learning from past mistakes – Realisation of the need to build capacity of local urban planners – Development of an inclusive policy formulation process – Complications with sustainable urbanisation due to outdated policies and guidelines

Table 19: Summary of findings on impact of rapid urbanisation on desert and arid land

	Impact	**Causes of impact**	**Effect on desert and arid land**
1.	Environmental impacts	– Increased pollution – Depletion of water resources – Increased climate change – Increased consumption of water	– Reduced air quality due to increased pollution – Water scarcity due to depletion of water resources – Increase in temperature levels (too hot) – Increased risk of natural hazards e.g. floods and droughts – Reduced vegetative cover due to encroachment
2.	Social factors	– Demographic changes – Increased urban population – Urban sprawl –	– Expansion of the city's urban boundaries – Increased demand for land for residential properties

			– Increased number of youth – Increased number of international migrants (e.g. foreign workers) – Increased risk of social and spatial inequalities – Poor delivery of services – Increased strain on public infrastructure (e.g. roads)

Table 20: Summary of findings on challenges in planning for sustainable urbanisation

	Challenge	Causes of the challenge	Effect on sustainable urban planning
1.	Poor urban planning interventions	– Lack of inclusive process of policy formulation – Lack of knowledge and skills on sustainable urban planning – Outdated policies and guidelines – Lack of institutional coordination	– Increase in urban sprawl – Poor land use where residential properties are prioritised at the expense of others – Low levels of community involvement in urban planning and implementation
2.	Public service facilities	– Increased urban population – Expanding boundaries of the city – Increased rural-urban migration – Increased rate of social and spatial inequality	– Unequal access to public service facilities – Lack of community involvement in sustainable urbanisation – Increased environmental degradation (e.g. due to traffic congestion)

Table 21: Summary of findings on integration of sustainable urbanisation into future development

	Strategy	How to implement strategy	Effect on sustainable strategy
1.	Community involvement	– Establishment of community centres to facilitate discussions between local community – Establishment of civic councils to facilitate engagement between the local community and the municipality officials	– Improved community involvement in monitoring sustainable urban projects – Increased accountability of the municipality to the local community – Increased public awareness of the importance of sustainable urbanisation
2.	Improved government intervention	– Improved and inclusive policy making processes – Equal distribution of resources – Improved environmental management – Diversification of the economy –	– Flexible policies and guidelines for sustainable urbanisation – Equal access to resources for all citizens – Increased job opportunities – Increased environment quality – Increased public infrastructure – Improved delivery of public services (e.g. water supply)

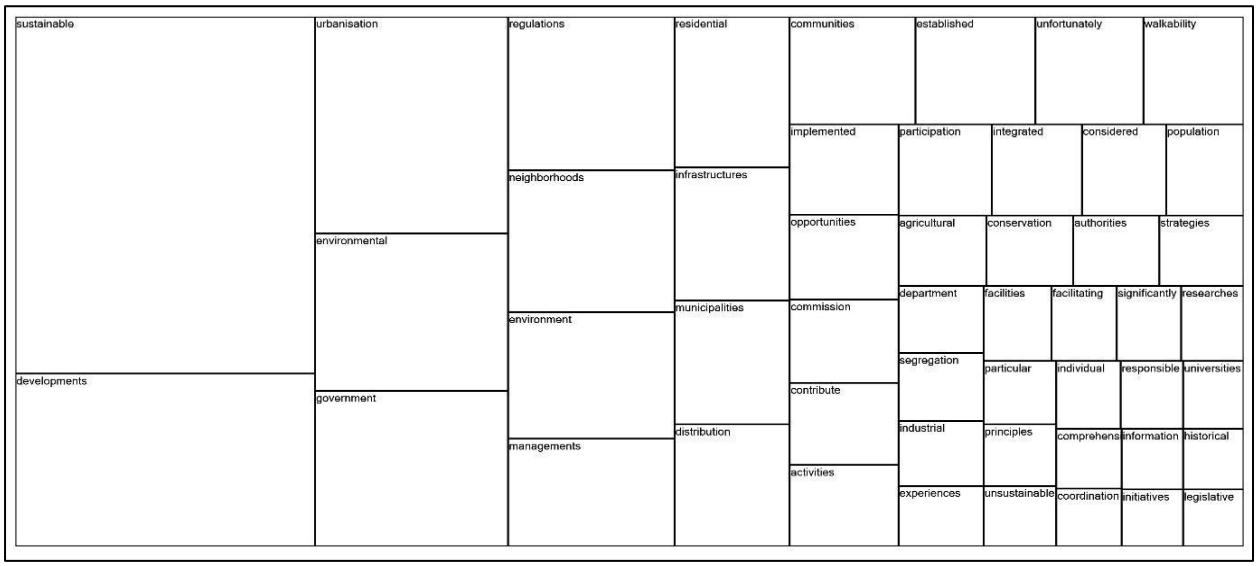


Fig. 7: Word frequency queries for all themes.

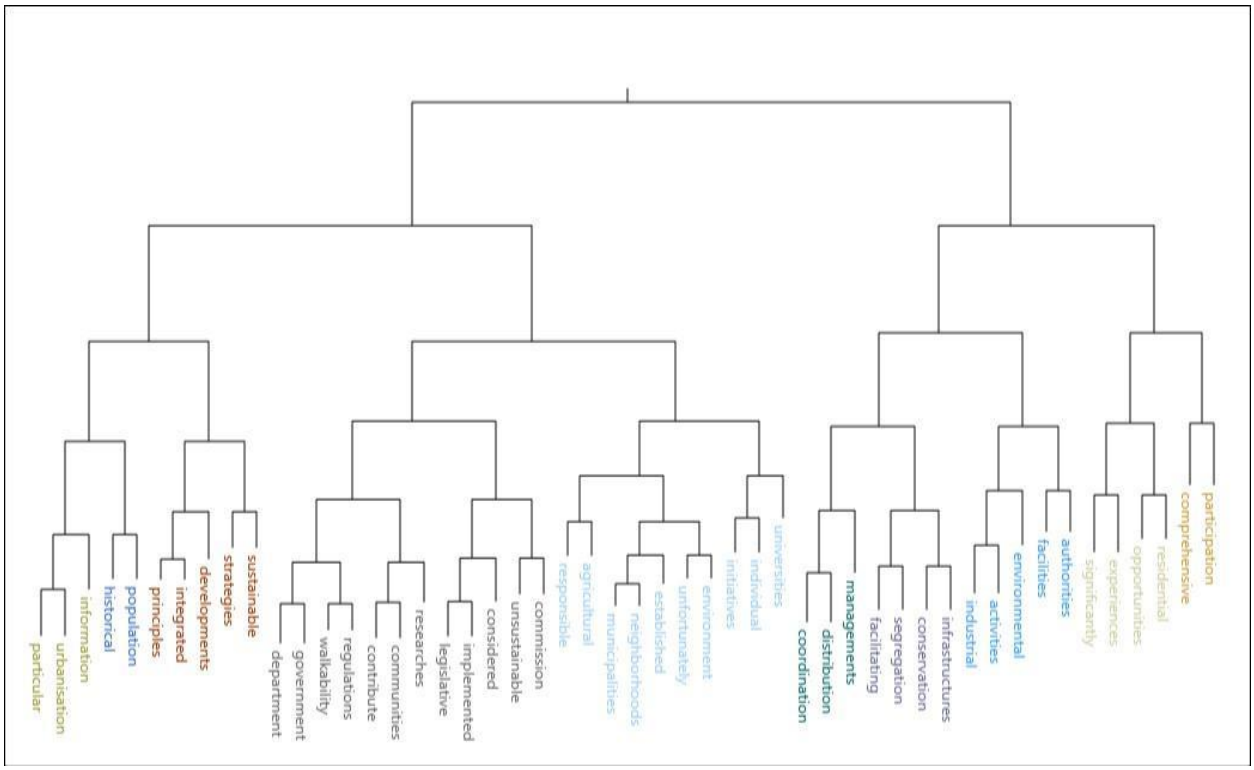


Fig. 8: Word frequency queries of tree map for all themes

Fig. 9: Word frequency queries of word cloud for all themes

Summary of findings (Official Documents)

Table 22: Summary of findings on barriers to sustainable urbanisation

		Barriers	Causes of barriers	Effect on sustainable urbanisation
1.		Outdated means of communication	▪ Weak policies and guidelines on roles and responsibilities on urban planning ▪ Centralised governance structure with minimal powers for the local governments (municipalities)	▪ Poor coordination among the different bodies and stakeholders tasked with urban planning and implementation
2.		Environmental pollution	▪ Poor waste disposal practices/methods	▪ Increasing amount of municipal

			▪ Increasing emission of greenhouse gases by cars and industries (e.g. chemical and cement industries) ▪ Groundwater depletion	waste and industrial waste ▪ Increased risk of methane emissions in landfills ▪ Reduced air quality due to increased greenhouse emissions ▪ Reduced water production and water supply

Table 23: Summary of findings on drivers of sustainable urbanisation

	Driver	Causes of driver	Effect on sustainable urbanisation
1.	Economic boom	▪ Increasing revenue from oil exports ▪ Presence of international migrants with spending power	▪ Completion of sustainable urban development projects ▪ Creation of employment opportunities for the youth
2.	Private sector investment	▪ Political will by the government to encourage private sector investment	▪ Diversification of the economy ▪ Creation of more employment opportunities for youth Riyadh residents ▪ Stimulation of the economic growth

Table 24: Summary of findings on improving quality of life

	Factor	How factor manifests itself	Effect on quality of life
1.	Gender equality	▪ Increased opportunities for women participation in the political space ▪ Increased opportunities for women in the workforce	▪ Increased number of women in the workforce ▪ Increased number of women in the political realm

		▪	
2.	Income equality	▪ Equal access to income generating opportunities for residents ▪ Equal access to job opportunities for all residents ▪ An inclusive business environment	▪ Improved living standards across the board e.g. food, housing and sanitation facilities ▪ Improved social cohesion among the residents
3.	Cleaner environment	▪ Better waste management methods ▪ Protection of groundwater resources	▪ Reduced municipal and industrial waste ▪ Adequate supply of water to cater for increasing demands

Table 25: Summary of the findings on environmental, historical and social factors affecting sustainable urbanisation

	Factor	**How factor manifests itself**	**Effects on sustainable urbanisation**
1.	Social factors	Socio-economic statuses e.g. ▪ Levels of urban poverty ▪ Health levels ▪ Education levels	▪ Poverty affects the ability of people to adopt sustainable urban practices ▪ Health levels determines whether residents are in the right frame of mind to ▪ Education levels influences people's understanding of sustainability and their level of public participation
		Social inclusion or exclusion e.g. unequal distribution of resources	▪ Skewed urbanisation process ▪ Increasing social and spatial inequality ▪ Deteriorating standards of living ▪ Increase in insecurity e.g. crime and violence

2.	Environmental factors	Land use e.g. ▪ High demand for land for residential properties ▪ Tourism expansion ▪	▪ Increased number of residential properties ▪ Reduced number of recreational facilities ▪ Encroachment on wildlife parks and groundwater resources ▪ Reduced vegetation cover ▪ Reduced agricultural land ▪
3.	Historical factors	Urbanisation e.g. ▪ Increased fertility rates ▪ Increased rural-urban and international migration	▪ Outdated policies and guidelines ▪ Ineffective delivery of public services ▪ Increased environmental degradation e.g. air pollution and poor waste disposal ▪ Inadequate amount of public facilities e.g. houses ▪ Changing socio-cultural fabric

Table 26: Summary of findings on the challenges in planning for sustainable urbanisation

	Challenge	**How challenge manifests itself**	**Effects on sustainable urban planning**
1.	Outdated policies	▪ Poor urban planning process ▪ Poor coordination among stakeholders tasked with urban planning and implementation ▪ Rigid policies and guidelines that do not adapt to changing times	▪ Increasing spatial and social inequality within the city ▪ Overlapping roles of various stakeholders in urban planning ▪ Low private sector investment in the municipality projects ▪ Increasing urban sprawl

			▪ Increasing environmental degradation ▪ Poor community involvement in urban planning and implementation
2.	High cost of living	▪ Increasing prices of basic goods e.g. food, water and houses	▪ Increasing frustration among unemployed youth ▪ Increasing risk of crime and violence among unemployed youth ▪ Increasing emergence of informal settlements ▪ Adoption of unsustainable practices

Table 27: Summary of findings on the impact of rapid urbanisation on desert and arid lands

	Impact	**Cause of impact**	**Effect on desert and arid lands**
1.	Environmental degradation	▪ Climate change or global warming ▪ Air pollution ▪ Poor waste management ▪ Natural hazards e.g. floods and droughts ▪ Wastewater pollution ▪ Groundwater depletion	▪ Reduced agricultural activity and produce due to climate change or global warming ▪ Increased amount of municipal and industrial waste ▪ Congested landfills due to poor waste management ▪ Reduced soil quality due to natural hazards ▪ Reduced water supply due to groundwater depletion and wastewater pollution

2.	Inconsistent government responsibility	▪ Lack of expertise among government officials in dealing with urban planning issues ▪ Expansion of the urban boundaries of Riyadh ▪ Outdated policies and guidelines on urban planning and implementation	▪ Poor implementation of urban planning ▪ Poor coordination among stakeholders involved in urban planning ▪ Shortage of public facilities e.g. roads, which lead to traffic congestion ▪ Poor delivery of public services to cover the wide spectra of the municipality ▪ Increased urban sprawl
3.	Increased urban sprawl	▪ Increased urban population ▪ Lack of flexible policies and guidelines to dictate the urbanisation process ▪ The REDF policy (granted loans to people with the freedom to build houses)	▪ Increased demand for land for building residential properties ▪ Encroachment on land areas meant for recreational facilities and green spaces ▪ Spatial inequality due to concentrated development in one side of the city

Table 28: Summary of findings on integration of sustainable urbanisation in future development

	Strategy	**How to effect strategy**	**Results**
1.	Sustainable urban practices	▪ Adoption of non-renewable energy	▪ Reduction in emission of greenhouse gases ▪ Reduction in costs of fossil fuel consumption
		▪ Use of sustainable building materials	▪ Development of affordable housing ▪ Increased supply of housing units

		▪ Adopt better water resource management methods	▪ Protection of water resources e.g. surface water and ground water
		▪ Better waste management methods	▪ Reduced municipal and industrial waste ▪ Decongested landfills
2.	Sustainable urbanisation framework	Restructuring of governance structure	▪ Improved coordination among stakeholders in sustainable urbanisation ▪ Increased role of municipalities in evolving local solutions to local issues ▪ Increased public-private sector partnership

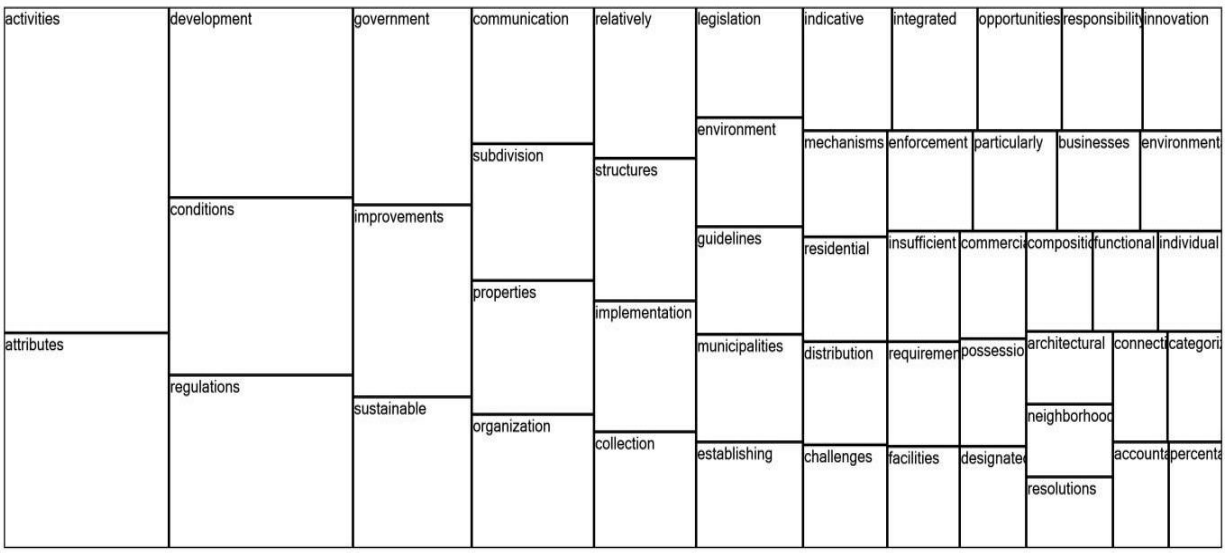


Fig. 10: Word frequency queries for all themes.

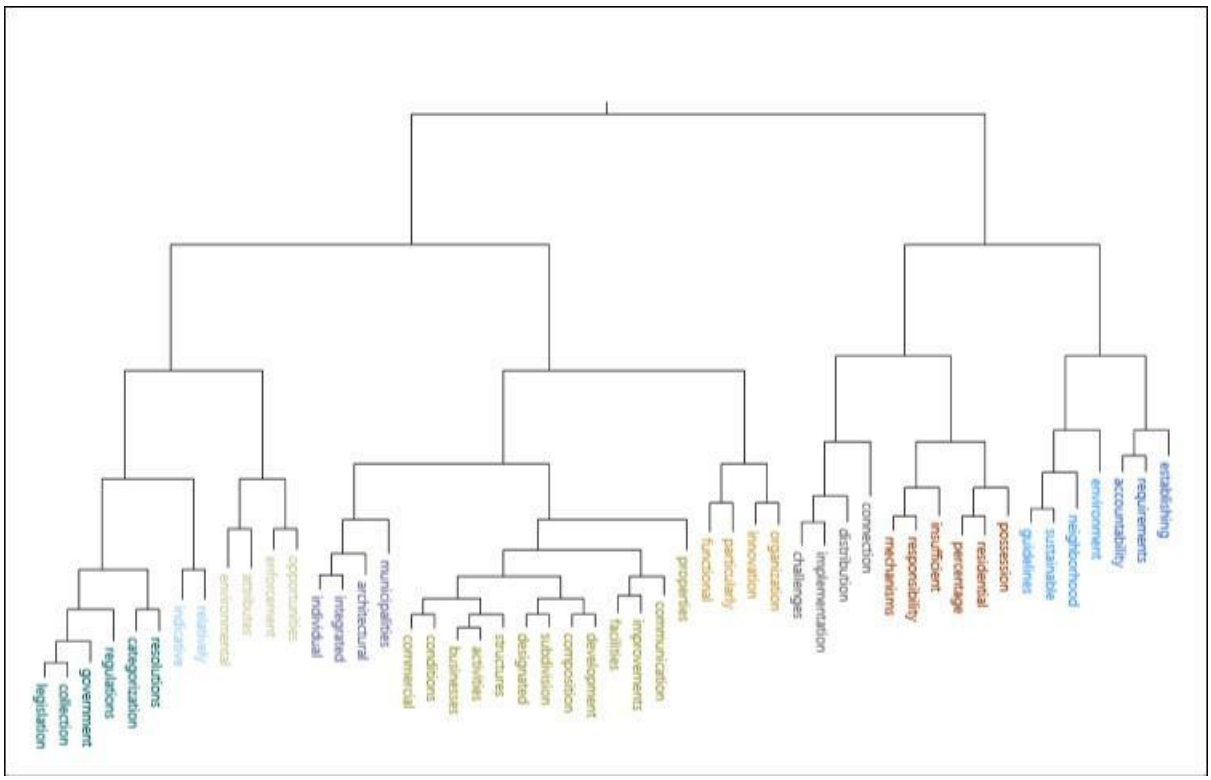


Fig. 11: Word frequency queries of tree map for all themes

Fig 12: Word frequency queries of word cloud for all themes

APPENDIX F: Factsheet on Study Findings and Proposed SU Framework

SUSTAINABLE URBANISATION IN DESERT CITIES: CASE STUDY RIYADH CITY

Background

The study, *"Sustainable Urbanisation in Desert Cities: Case Study Riyadh City"* was a qualitative study that sought to identify the social, environmental, physical, political and economic factors associated with sustainable urbanisation in Riyadh. The study also sought to develop a sustainable urbanisation (SU) framework for achieving sustainable urbanisation and living in desert cities, such as Riyadh. Undertaken in two phases (exploratory and main study), the research employed in-depth interviews (IDIs) with Riyadh residents, urban planning officials/government experts and academics and researchers. The study was concentrated in five areas of Riyadh including, Al-Olayyah, Nemar, Al-Naseem, Al-Ma'athar and Al-Diriyah.

Objectives

The main objective of the study was to identify the social, environmental, physical, political and economic factors of sustainable urbanisation in Riyadh in addition to developing a SU framework for achieving sustainable urbanisation. Specifically, the study aimed:

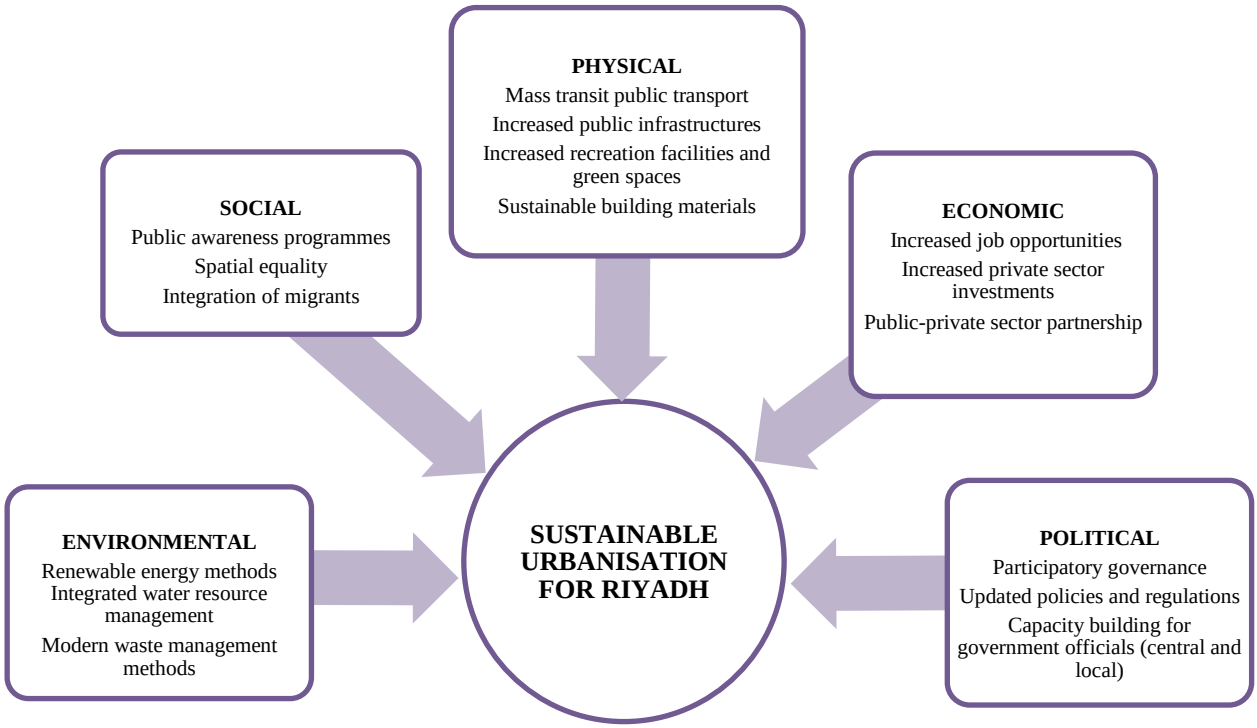
- To examine the drivers and barriers to sustainable urbanisation in desert cities, such as Riyadh;
- To identify and examine the economic, social and environmental factors of sustainable urbanisation (SU);
- To identify the challenges in planning for sustainable urbanisation in Saudi Arabia; and
- To propose a sustainable urbanisation framework to inform future development of urban areas within Riyadh and other desert cities.

Findings

- Political will and availability of revenues from oil exports are the key drivers of sustainable urbanisation in Riyadh
- The barriers to sustainable urbanisation include poor government supervision, poor public involvement, outdated policies and legislation, environmental degradation, urban sprawl and poor urban planning
- Sustainable urbanisation can improve the quality of life through better urbanisation policies, improved public services, improved environmental management, equitable resource distribution, better housing and increased job opportunities

- Social factors affecting sustainable urbanisation include population growth rate, public awareness levels, equality and changing lifestyles
- Environmental factors affecting sustainable urbanisation include increased pollution, environmental management, climatic conditions, water resource management and waste management
- Historical factors affecting sustainable urbanisation include historical sites, past urbanisation processes and heritage of Riyadh
- Challenges in planning for sustainable urbanisation include poor coordination among urban planners, outdated policies and legislation and high population growth
- Impacts of rapid urbanisation on desert and arid lands include increased urban population, increased environmental pollution, strained infrastructure and increased natural hazards
- Sustainable urbanisation can be integrated into future development through increased public involvement, better urban planning and improved government intervention

Proposed Sustainable Urbanisation (SU) Framework



Proposed SU framework developed for all categories of respondent

APPENDIX G: All reports and documents

- The Updated Implementing Regulation for The Rules of Urban Boundary till 1450H - 2030
- Sustainable Planning Guidelines for Urban Growth in the Kingdom
- The Comprehensive Report - Metropolitan Development Strategy for Riyadh (MEDSTAR)
- Report - Review and evaluation of urban planning legislation in Saudi Arabia
- Saudi Arabia Vision 2030 report