

ADOPTION OF SMART AND SUSTAINABLE STRATEGIES IN THE STATE OF QATAR

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**A thesis submitted in partial fulfilment of the requirements of the University of
Wolverhampton for the degree of Doctor of Philosophy (PhD)**

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DEDICATION

This thesis is dedicated in memory of my late father Salem bin Rashed Al-Meraikhi and my late husband Ali Al-Meraikhi. I would also like to dedicate this thesis to my mother Shamma Al-Mansori, to my daughter Buthayna and my son Hamdan.

ABSTRACT

With the increasing importance given to sustainable development nowadays, countries around the world are shifting their focus and efforts to changing the previous unsustainable growth framework that has been ineffective. Therefore, Qatar, following in the footsteps of the rest of the world, decided to introduce a sustainability plan to ensure the population's prosperity through its Qatar National Vision 2030 (QNV 2030). However, little is known about how Qatar organisations are responding to this encouragement. The aim of this research is to investigate how Qatar public sector organisations are embedding smart and sustainable strategies in order to achieve the QNV 2030. Given the relatively new and unexplored nature of the research problem, a qualitative research method was adopted to collect and analyse data. Semi-structured interviews with 56 professionals were used to collect data which was then analysed using content analysis for inference and conclusion.

The study concluded that smart and sustainable issues are complex, dynamic, and multifaceted. A complex mix of government, economic, social and environmental forces drives Qatar organisations to implement smart and sustainable strategies. Overall, the outlook for improved sustainable strategies efforts from the state of Qatar looks quite promising at present. Qatar organisations face significant challenges in taking the first steps towards implementing smart and sustainable strategies. To improve smart and sustainable performance, therefore, leaders have to recognise and better understand the concept of smart development and sustainability. The current study results suggest that, to meet the goals of the QNV2030, the implementation of healthcare strategies is still evolving in the State of Qatar. Therefore, there is a need to re-examine the National Health Strategy to Qatar's health challenges, aligned to a global shift in thinking towards population health and smarter and more integrated care. The scarcity of knowledge and expertise associated with sustainable strategies is, and will continue to be, a huge challenge for Qatar public sector organisations. Therefore, training programmes related to the management of smart and sustainable related knowledge will help leaders, managers, and change agents better understand how to craft and implement various smart and sustainable strategies to achieve QNV 2030. An innovative business model for the integration of smart and sustainable strategies into day-to-day operational decisions was developed and validated. This model is intended to offer guidance for the successful implementation of smart and sustainable strategies to simultaneously improve environmental, social and economic performance. It is recommended to explore the level of embeddedness of smart and sustainable strategies in the public sector between developed and developing countries.

CHAPTER 1 : AN INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

This opening chapter discusses the background and justification for smart and sustainable management strategies adopted in Qatar public sector organisations for improved competitiveness. Also, it presents the research aim, objectives, and research questions. Furthermore, it highlights the potential benefits of the current research. Finally, it presents the structure of the thesis.

1.2 BACKGROUND TO THE RESEARCH STUDY

The concept of “sustainable development” must become as much a part of everyday life as the words have become a part of everyday language. However, for local, regional, and national organisations, having a clear and comprehensive understanding of sustainable development is critical in order to pursue a sustainable pathway of development (Richer, 2015). Qatar has been focusing on sustainable development since its independence in 1971. This focus has covered the three dimensions of sustainable development: social, economic, and environmental. Over time, the government has established many development-oriented institutions and authorities, including the Supreme Planning Council, the General Secretariat for Development Planning, and the Ministry of Development Planning and Statistics. Since the launch of QNV 2030 in 2008 with its four pillars (human development, social development, economic development, and environmental development), this vision aimed to change the face of life in Qatar (Al Nabit, 2017).

With the publication of the Qatar National Vision 2030 and the National Development Strategy 2011–2016, the leadership of Qatar outlined the developmental goals for the next two decades, goals that embrace the ideals of sustainable development. However, sustainable development is not merely a goal to be reached. It is a process of uniting formerly independent social, economic, and environmental policies into a systems approach (Richer, 2015).

This process will continue to evolve as our knowledge and experience increases (Hjorth and Bagheri, 2006), and our governance and management policies become increasingly adaptive (Angelstam *et al.*, 2013) to tackle social-ecological challenges. Achieving a sustainable society depends on having the tools to measure progress (social, economic and environmental), which requires a transdisciplinary research focus, sound policies, and the political leadership and regulatory bodies to implement policy. These tools need to be coupled with a move toward a green economy or green growth.

According to GSDP (2009), sustainable development is a process that seeks to meet the needs of the present generation without compromising the ability of future generations to meet their needs. This is often called intergenerational justice. The rights of future generations would be threatened if the depletion of non-renewable resources were not compensated by the creation of new sources of wealth. The Qatar National Vision will choose the development path that carefully balances the interests of the current generation with the interests of future generations (GSDP, 2008).

The idea of sustainable development is not new. Over the course of human history, most cultures have adopted practices that enabled them to sustain their resources in order to meet their communities' present and future needs. What is new is an articulation of these

ideas in the context of a globalised world. Sustainable development is taken to refer to three interdependent and mutually reinforcing pillars: economic growth, social equity, and environmental protection (GSDP, 2009).

Sustainable development is a path of economic and social development that incorporates, and is not independent of, the natural environment. When considering economic and social development, it is important to realise that the economy and the social aspects of human activity take place within the environment and are completely dependent upon the environment. However, the scale of human activity is now so great that humans fundamentally affect the functioning of the global environment (Vorosmarty *et al.*, 2010; Steffen *et al.*, 2011) such that we risk exceeding planetary environmental boundaries, resulting in sudden and potentially catastrophic global environmental change (Rockstrom *et al.*, 2009).

The challenges presented by human population growth on the ability of the Earth to continue to act as a source of resources and a sink for emissions re-emerged in the mid-20th century (Carson, 1962; Hardin, 1968). The idea that the Earth has a limited carrying capacity was brought to the attention of the greater international community, with the publication of *Limits to Growth* in 1972 (Meadows, 1972). The authors were widely criticised at the time for being Malthusian and underestimating the ability of technology and human inventiveness to counter fundamental limits of the Earth's capacities. Publication of the book did initiate the idea of resource limits and begin an international dialogue leading to the World Commission on Environment and Development (WCED) in 1983. The report of the Commission (commonly referred to as the Brundtland commission after the Chairperson Gro Harlem Brundtland), *Our Common Future*, introduced the idea of sustainable development as “development that meets the needs of

the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). It brought to the forefront the concept of interdependence between economic and social development and the environment, which has since been elaborated by Agenda 21 (UNCED, 1992) and the Rio (+20) outcome paper (UN, 2014).

Sustainable development is a model of good asset management. While the description of sustainable development in UN reports outlines the concept of sustainable development, it does not set enforceable limits or give political leaders the information or tools they need to make informed decisions and establish policies. The concept of sustainability does provide an outline as to how resources must be managed, as reviewed by Rennings and Wiggering (1997). Three basic guidelines for natural resource use include the following: the maximum sustainable yield cannot be exceeded for renewable resources; emissions cannot exceed the capacity of the ecosystem to absorb waste; and non-renewable resources should be exploited at a rate only as great as the creation of renewable substitutes.

To ensure these conditions are met, a scientific base must be established concerning maximum yields for renewable resources, and critical levels and loads for ecosystem absorptive capacity basic information, which is currently lacking for Qatar.

The mechanism of achieving sustainable development itself has been hotly debated, including whether pursuing sustainability lies with the choices of individuals or institutional and technological advances (Robinson, 2004). Despite some criticism, it may be most productive to think of sustainable development as an approach to development that “integrates environmental, social and economic issues in a long-term perspective” (Robinson, 2004) in a way that not only incorporates the interests of markets and business

(UNEP, 2011) but utilises them to drive positive changes. In this way, many, if not all, stakeholders can be included, despite potential differences in ideology concerning the why and the way that sustainable development should be pursued (Sneddon *et al.*, 2006).

Hence, sustainable development is economic development that supports social development, or improvement of human well-being, without compromising the fundamental environmental and cultural framework in which it takes place, thus ensuring intergenerational equity. More recently, UNEP has gone further in outlining how transforming to a “Green Economy” (GE) or “Green Growth” (GG) will fundamentally revitalise the global economy while protecting social and environmental interests with a mere 1–2 percent of GDP investment (UNEP, 2011). Green growth or green economy will fundamentally tie together economic growth and environmental management or development. Thus, rather than economic, environmental, and social pillars of sustainable development, environment and economic growth are intrinsically tied with environmental development being at the core of economic growth (Richer, 2015).

1.3 JUSTIFICATION FOR THE STUDY

Qatar faces several natural challenges, such as water scarcity, extreme high heat, weak biodiversity, high sand/pollutant-based particular matter in the air, and high carbon emissions. According to the World Bank (2016), CO₂ world emissions have increased by 369 percent from 1960 to 2011. This figure sustains the increasing concerns related to the growing sustainability problems that are currently affecting the environment. In addition, environmental indicators have demonstrated that other non-CO₂ gases present similar behaviour. It can be noted that the annual production of both methane emissions and nitrous emissions has increased by 151 and 142 percent respectively, which illustrates the level by which air contamination has been continuously rising over the past decades. For

instance, Qatar's great reliance on the energy sector is responsible for emitting various pollutants that have adverse effects on air quality, because components like nitrogen oxides (NO_x), sulphur oxides (SO_x) and volatile organic compounds (VOCs), when combined with high levels of dust, can have a destructive impact on the environment and people's health.

Seeing Qatar's geographic position, the country could suffer a lot from climate change; with rising sea levels, the country would be obliged to invest significantly in adaptation measures to protect the community and industry located in low lying areas. Furthermore, higher temperatures would really damage the country, since it is already characterised by high temperature levels in the summer. High temperature would also lead to moisture loss, resulting in further desertification, increase in the need for water and more energy for water desalination. The Gulf region's high development of fossil fuel extraction and energy-based industry is responsible for the region's notable increase in greenhouse gases emissions from 0.8 percent in 1973 to 5.2 percent of the worldwide emissions in 2012, with Qatar responsible for 4.6 percent of the region's emissions, and the world's highest rate of GHG emissions per capita (QatarGas, 2014).

Qatar has been experiencing unexpected growth in its population since 2004 (Middle East Journal, 2016), as it increased from 0.8 million back in 2004 to 2.34 million in 2016. This huge increase has mainly been caused by the influx of expatriates arriving for job opportunities. This large and fast growth in population was not predicted in the QNV 2030 or NDS 2011-2016.

The concept of sustainability has become the main emphasis of every-day phenomena, which emerged due to the realisation of the economic and social development of the

economy (Chan *et al.*, 2012). Countries in this recent generation have been increasing their efforts to meet the challenges in order to sustain and work for the overall sustainability of the environment, as well as their economic position (Yigitcanlar *et al.*, 2008). In this case, the urban population has been constantly growing and a large number of countries has been focusing on sustainability issues to focus on health and healthy lifestyles of the people. Karadağ (2013) revealed that the transformation of cities from their traditional infrastructure to modern and smart cities has been considered as the crucial process that is needed to be searched in terms of the major factors that affect the development of sustainable and smart cities. However, it must be noted here that this transformation process of cities needs proper review of resources that are majorly found in less and limited amount.

Freeman (2017) revealed that the concepts of smartness or sustainability are defined as the ability of people or anything to utilise information and transform it into a desirable form or practice via effective use of resources, in a limited time and by using information technologies. Moreover, it has also been revealed that the transformation of cities from their traditional infrastructure to a more modern, smart and sustainable version requires a framework based on an integrated approach; based on organisational, social, economic and competitive properties of the economy (Anttiroiko, *et al.*, 2014). Therefore, the development of a strategic framework helps in efficient planning, usage, and allocation of resources. According to Chourabi *et al.* (2012), the concept of sustainable and smart cities is majorly concerned with the smartness and sustainability in terms of governance, mobility, economy, people, environment and living of the people.

In this modern era, the concepts of urbanisation and the neoliberal smart city have been considered as the combination of three different notions: the city of digitisation, the

entrepreneurial city, and the city of sustainability (Korninos, Pallot and Schaffers, 2013). Grant (2009) identified the concept of the information city, which has been defined as the main concept introduced under the umbrella of urban development or urbanisation. However, the concepts of information and digital city development limit understanding regarding how the Internet can help in introducing changes or transforming the city into a smart city, as the social and economic issues are impossible to be catered through the Internet or any other informative technologies that are becoming the latest trends and necessary for the economy (Yigitcanlar, *et al.*, 2008). Apart from the digital-visionary approach, the rise of the entrepreneurial city has been defining the overall concept of smart and sustainable cities where the corporate sectors and private organisations have increased their focus in maintaining sustainability. Hence, it can be said that sustainability and smartness have become the major concern of today's market for the majority of policy makers, researchers and engineers in this world of urbanisation.

The Qatar National Vision 2030 (QNV 2030) aimed to “provide a framework within which national strategies and implementation plans could be developed” (QNV 2030). It offered “a set of guiding principles that all national development must adhere to”, and it was based “on four fundamental pillars of human, social, environmental and economic development”. The overall aim of the Qatar National Vision 2030 was to build a “bridge between the present and the future.” The Vision envisaged: “A vibrant and prosperous country in which there is economic and social justice for all, and in which nature and man are in harmony. We need to galvanize our collective energies and direct them toward these aspirations. Strong Islamic and family values will provide our moral and ethical compass.”

The QNV 2030 is committed to maintaining harmony between economic growth, social development, and environmental management in building a bright future for the people of Qatar. It identifies the goal of the environmental pillar, one of four interrelated pillars, as an increasingly important challenge. It recognises that, while there are environmental costs to be paid for economic progress, economic development and protection of the environment are two demands neither of which should be sacrificed for the sake of the other. Qatar's future development path must be compatible with the requirements of protecting and conserving the environment (GSDP, 2009).

Observers estimated that the cost of delivering the infrastructure necessary to meet the 2030 Vision could reach over \$149bn and a further \$126bn would have to be invested in housing, schools, hospitals, shopping centres, and rail networks. With no end in sight for the great recession that hit most developed economies around the world after 2008, competition from international consortiums would be intense. Plans for the first phase of a new \$40bn Doha metro - an urban underground/overground city train system for Qatar's capital - attracted more than 60 expressions of interest.

Today, organisations can succeed only if they are genuinely 'value-led' and adopt a holistic rather than a silo approach to social, economic and environmental issues. As noted by Drucker (2002), "every single pressing social and global issue of our time is a business opportunity". The above statement clearly conveys that organisations that successfully embrace the smart and sustainability agenda and integrate it into their daily business operations will thrive. While sustainability is becoming acknowledged as imperative to business, there is little cohesive guidance as to either how managers and leaders can identify the best focus for sustainability practices in their businesses or how

they can best embed them or indeed, how they can identify what it really means for them as unique organisations.

Kay (2004) on several public sector organisations suggested that, though the resource-based view and triple bottom line approaches are central to the notion of competitive advantage in private firms, they only apply to public sector organisations where competition exists. This is mainly because public firms are funded by the government for public service and frequently do not need to compete with other organisations offering a similar set of services to the public (Prajogo *et al.*, 2012).

Another need that has drawn the attention of researchers, managers, scholars and even the public is the need to grow businesses to more sustainable levels (Smith *et al.*, 2010). It is now an accepted fact that social, economic and environmental consequences that are created by rapid population growth, economic growth, and consumption have become concerns for many organisations, be it private or public (Millar, *et al.*, 2012). Therefore, sustainability has become a huge agenda of the need for change management and it is a key driver for success (Millar, *et al.*, 2012) in any type of organisation (St. Claire, 2013). However, for an organisation to make this kind of change, it needs to start from the very top and have employees and other stakeholders actively involved, requiring skilful distribution of power and authority (Doppelt, 2009).

The question still arises as to how Qatar's public sector leaders can practically embrace sustainability-related changes and embed them within their organisations. While there is a substantial body of literature on the technical issues of sustainability, notably resource and carbon management, and metrics to measure change, there has been considerably less research into the actual practices and integration of sustainable thinking into models and

policies for public sector organisations, which is the *raison d'être* of this research. Therefore, the aim of this research is to investigate the key smart and sustainability initiatives currently being implemented in Qatar's public sector organisations so as to improve their competitiveness.

Once an issue is chosen, decision makers will be challenged regarding recommendations on the initiatives that should be selected to support sustainability (Kotler and Lee, 2005). They need to be prepared to answer tough questions: Why and how can they integrate sustainability initiatives without distracting from the core business? How will sustainability initiatives give visibility to the organisation? Do these initiatives really work?

Social development ensures sustainable growth in relevance to community development in terms of living standards, knowledge enhancement, education and employment. Human development ensures development of skills and professional development of the human resources that lead to stimulating self-efficiency and competency. Human development affirms availability of skilled and expertise people in a society (Dunn, 2006). Economic development reflects the soundness of economy in terms of liquidity and growth prospects. It indicates favourable monetary policies and economic developments that ensure the sustainability of the business sectors' growth. In the same way, environmental development that leads towards sustainable development guarantees preservation of the natural environment or ecology and natural resources for future generations (Dyllick, 2002). The concept of sustainability is defined as management of the existing resources or capabilities through the efficient use of resources, along with institutional change management, that fulfil human needs in the current and future period (Schäfer, 2016).

Management is the art of managing people and resources in formally organised way through following management principles like unity, fair remuneration, and unity of command, authority and responsibility, a division of labour, centralisation, and decentralisation (Dunn, 2006). Sustainable practices for managing of business aspects would render benefits in terms of maintaining the quality of work, higher efficiency, and competitive advantage. The application of sustainability management is not limited to business management, but can be extended to personal aspects of people's lives in order to manage work and efficiency in the long run (Giovannoni, 2013).

Sustainable management is important for the integration of organisation policies and practices in alignment with management principles that ensure a competitive position. It ensures stability in the business world that might cease in case emerging market demands have not been fulfilled. Prosperity is ultimately correlated with sustainability management that ensures continuity of business operations in the right manner that supports growth (Heinberg, 2010). Sustainability management is the duty of a manager or people in management positions to look after business system management to ensure survivability of resources like human resources, business resources, and natural resources in the present and future context (Madu and Kuei, 2012).

Qatar is an emerging economy and the country has applied new models in management which specifically focus on the vision of the country. The development model of the country is highly different because it was primarily dependent on the oil and gas industry and gradually moved over to a more diversified model for economic development that focused on the growth and development of various different sectors of the economy. The growth model of the economy is also based on visionary policies and prudent decision

making (Mallakh, 2015). However, there has been no significant academic study or research undertaken on the sustainable development of Qatar that helps in understanding the ways in which the economy emerged out of the financial crisis and dependence on oil and gas.

The examination of the prevailing literature has also revealed some pertinent and underlying problems in the country that might still serve as a hindrance in the Qatar vision 2030 (Fromherz, 2012). These problems have primarily been identified to be largely associated with natural and human resource management, where there are issues related to the lack of effective and essential skills as required by the employers in the public sector, disparities in the labour market, unemployment rates, prevalence of unethical work practices in the public sector, uncoordinated training systems in the public sector and ineffective administrative and managerial sustainable practices (Gonzalez *et al.*, 2008). Each of these problems indicates significant issues in human development, specifically in the public sector in Qatar, which can create pertinent barriers for the Qatar vision 2030.

1.4 RESEARCH AIM AND OBJECTIVES

The aim of this research is to investigate how Qatari public sector organisations are embedding smart and sustainable strategies in order to achieve the Qatar National Vision 2030. In order to achieve this aim, the following objectives were identified.

1. To explore and document the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations
2. To investigate and document the key sustainable initiatives needed to effect change that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030

3. To explore and document the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda
4. To investigate and document the key knowledge management strategies in the context of smart and sustainable strategies that are currently being implemented in Qatari organisations
5. To critically appraise and document the main challenges the Qatari organisations face in implementing smart and sustainable strategies
6. To develop and validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations

1.5 RESEARCH QUESTIONS

The following research questions were posed for the current study (see Table 1.1):

1. What are the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations?
2. What are the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National vision 2030?
3. What are the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda?
4. What are the key KM strategies in the context of smart and sustainable strategies currently being implemented in Qatari public sector organisations?
5. What key challenges do Qatari organisations face in implementing smart and sustainable strategies?
6. Is there a need for developing and validating an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations?

Table 1.1: Traceability matrix of research objectives, research questions and chapter addressed

Sl. No.	Research Objectives		Research Questions	Chapter addressed
RO1	To explore and document the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations	RQ1	What are the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations?	Chapter 2 Chapter 3 Chapter 5
RO2	To investigate and document the key sustainable initiatives needed to effect change that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030	RQ2	What are the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National vision 2030?	Chapter 2 Chapter 3 Chapter 6
RO3	To explore and document the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda	RQ3	What are the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda?	Chapter 2 Chapter 3 Chapter 7
RO4	To investigate and document the key knowledge management strategies in the context of smart and sustainable strategies that are currently being implemented in Qatari organisations	RQ4	What are the key KM strategies in the context of smart and sustainable strategies currently being implemented in Qatari public sector organisations?	Chapter 2 Chapter 3 Chapter 8
RO5	To critically appraise and document the main challenges the Qatari organisations face in implementing smart and sustainable strategies	RQ5	What key challenges do Qatari organisations face in implementing smart and sustainable strategies?	Chapter 2 Chapter 3 Chapter 9
RO6	To develop and validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations	RQ6	Is there a need for developing and validating an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations?	Chapter 2 Chapter 3 Chapter 10

Legend: RO = Research Objective; RQ = Research Question

1.6 BENEFITS OF THE STUDY

The study will be of benefit to employees, managers, and leaders at every level and in every function of Qatari public sector organisations. The results of the study will:

- Improve understanding and awareness of the meaning of smart and sustainability issues at a conceptual level.
- Assist policy and decision makers in understanding the forces that drive the need to change the development strategies towards a plan that is smart and sustainable at its core.
- Guide public sector organisations to effectively manage smart and sustainable strategies implementation and the challenges that this change brings.
- The developed innovative business model for sustainability provides broader guidance for organisations to implement smart and sustainable initiatives into day-to-day practices. The business model could also help decision makers to craft and deploy key smart and sustainable strategies to improve competitiveness.
- The business model that will aid private, public and international investors in successfully implementing smart and sustainable projects in Qatar.

1.7 SCOPE AND LIMITATIONS OF THE STUDY

The empirical scope of this study is limited to Qatari public sector organisations. The unit of analysis adopted for this study is the ‘organisation’ and the embedded unit is the ‘individual employee’. Therefore, this study does not report the differences between private and public sector or the approaches of micro enterprises, small and medium-sized enterprises and large organisations to smart and sustainable initiatives for improved competitiveness.

The research reported in this study is largely exploratory in nature. This is because of the inductive nature of the methodology adopted. The goal of this research is to answer the research questions rather than testing hypotheses. Additional research with more elaborate and articulated designs is therefore called for, to further explore the complex relationships involved in implementing smart and sustainable initiatives for improved competitiveness.

An innovative business model for sustainability has been developed and validated. Even though the business model has been developed and validated with experienced professionals, it has not been tested within an organisation. Although the study explains smart and sustainable strategies in a generalised way, the focus of the research is the state of Qatar. As such, the business model created is specifically for Qatar, while some of the components can be used globally. However, successful implementation will depend on the specific situation of the country it has been implemented in. The sustainable development status of the country will define the drivers, challenges, and benefits of the model.

1.8 STRUCTURE OF THE THESIS

The thesis has been organised in a logical manner in order to enable the reader to gain insight and understanding of how the key research objectives and research questions have been achieved. The layout of the thesis is in a logical sequence, commencing with the introduction to the study in chapter 1 to the conclusions and recommendations in chapter 11.

The structure is as follows: a review of literature was conducted at each stage to enable a better understanding of the research topic. This formed the basis of the study and allowed for developing research questions. Furthermore, the research methodology employed is discussed. Semi-structured interviews with directors, advisers, and managers responsible for implementing Qatar National Vision 2030 in Qatari public sector organisations were conducted for the study. Results of the qualitative data analysis are reported. This led to the development of an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations, which was validated then the conclusions and recommendations are drawn.

Chapter 1 – explains the background and justification for the study. Then it discusses the research aim, objectives and research questions. Also, it highlights the potential benefits of the study, scope and limitations of the study and gives a brief overview of the other chapters.

Chapter 2 and 3 – review the relevant literature in the area of sustainability, policies and tactics implemented by the Qatari government relating to its sustainability strategy, smart cities, knowledge management (KM), and business model innovation for sustainability. A thorough review and analysis of the relevant literature helped to identify research gaps.

Chapter 4 – discusses the research methodology that was used to empirically investigate the research aim and objectives. The chapter also discusses why a qualitative methodology was adopted. Furthermore, the sample size chosen for the study has been explained. The research process adopted for the study has also been described.

Chapter 5 – discusses the key reasons for implementing smart and sustainable strategies in the Qatari organisations. The results are based on the perceptions of the 56 interviewees. The findings are also substantiated with the relevant literature. Finally, chapter 5 concludes with a summary. Overall, chapter 5 addresses the first objective of the current study.

Chapter 6 – primarily reports the key sustainable strategies that have been implemented in Qatari public sector organisations. The results are based on the perceptions of the 56 interviewees. The findings are also substantiated with the relevant literature. Finally, chapter 6 concludes with a summary. Overall, chapter 6 addresses the second objective of the current study.

Chapter 7 – presents the key smart cities strategies that have been implemented to achieve Qatar’s smart cities agenda. The results are based on the perceptions of the 56 interviewees. The findings are also substantiated with the relevant literature. Finally, chapter 7 concludes with a summary. Overall, chapter 7 addresses the third objective of the current study.

Chapter 8 – discusses the key strategies that have been implemented in managing knowledge in the context of smart and sustainable strategies in Qatar. The results are based on the perceptions of the 56 interviewees. The findings are also substantiated with the relevant literature. Finally, chapter 8 concludes with a summary. Overall, chapter 8 addresses the fourth objective of the current study.

Chapter 9 – discusses the key challenges Qatari organisations face in implementing smart and sustainable strategies. The results are based on the perceptions of the 56

interviewees. The findings are also substantiated with the relevant literature. Finally, chapter 9 concludes with a summary. Overall, chapter 9 addresses the fifth objective of the current study.

Chapter 10 – presents an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations. The findings from the previous stages of this research study were taken into consideration in the development of the model. Finally, chapter 10 concludes with a summary. Overall, chapter 10 addresses the sixth objective of the current study.

Chapter 11 – focuses on the conclusions and recommendations drawn from this study. It summarises the key findings of this research and also provides recommendations for future research.

CHAPTER 2 : A REVIEW OF LITERATURE ON SUSTAINABILITY AND QATARI SUSTAINABLE DEVELOPMENT STRATEGIES

2.1 INTRODUCTION

This chapter presents a thorough review of literature in the area of sustainability and policies and tactics implemented by the Qatari government relating to its sustainability strategy. This chapter aims to evaluate Qatar's current sustainable development policy, challenges and opportunities that could be faced by the government to achieve the QNV 2030. This chapter concludes with a summary.

2.2 CONCEPT OF SUSTAINABILITY

As emphasised by Kidd (1992), the concept of sustainability is not new, it has a rather long history, and it has evolved over time. Even though the large number of definitions on sustainable development (Parkin *et al.*, 2003); yet there is much debate as to its precise definition. However, it is probably best captured by Gro Harlem Brundtland, former president of Norway, who chaired the World Commission on Environment and Development in 1987. A widely used and internationally accepted definition is “development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs” (WCED, 1987).

The UK government offered the following interpretation of sustainable development: “Ensuring better quality of life for everyone, now and for generations to come” (DEFRA, 2005). Marshall and Brown (2003) noted that neither the UK government definition nor the Brundtland definition provide guidelines for business action. One of the hurdles in this process has been the absence of an adequate framework that links environmental,

social, and economic sustainability goals in terms of profitability and risk, the ‘language’ of business.

The concept of sustainable development has received growing recognition, but it is a new idea for many business executives. For most, the concept remains abstract and theoretical. For the business enterprise, sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future. This definition captures the spirit of the concept as originally proposed by the World Commission on Environment and Development and recognizes that economic development must meet the needs of a business enterprise and its stakeholders. The latter include shareholders, lenders, customers, employees, suppliers and communities who are affected by the organization’s activities (IFC, 2012).

The role of business in contributing to sustainable development remains undefined. While all business enterprises can make a contribution towards its attainment, the ability to make a difference varies by sector and organization size. Some executives consider the principal objective of business to be making money. Others recognize a broader social role. There is no consensus among business leaders as to the best balance between narrow self-interest and actions taken for the good of society. Companies continually face the need to trade off what they would ‘like’ to do and what they ‘must’ do in pursuit of financial survival (IFC, 2012). The concept of sustainable development needs to be incorporated into the policies and processes of a business if it is to follow sustainable development principles. This does not mean that new management methods need to be invented. Rather, it requires a new cultural orientation and extensive refinements to systems, practices, and procedures (Sheshan, 2015).

Flouris and Yilmaz (2016) noted that sustainability development has emerged as a strategic issue because it requires a large amount of money and a significant investment of time and resources. Many organisations have recognised the importance of sustainability development and have begun to consider it an opportunity that helps in reducing the risks, delivering better and quality products and services along with improving the relationship with employees, suppliers, government agencies and customers (Schreckenber, 2010). In addition to this, many organisations are adopting various sustainability programs that are focused on reducing greenhouse gases, energy, chemicals, and waste along with empowering the employees for more innovations that lead to sustainability (Kopnina and Blewitt, 2014). Over the past few decades, many countries and organisations have built different sustainability programs that help them to manage the environmental impact and minimise the use of resource along with improving their social responsibility.

As per Leblanc (2016), sustainability is considered the driver for growth and influences the performance of the organisation. Studies have shown that sustainability initiatives can help in the management of governance, social and environmental issues which are important in areas such as reputation building, corporate strategy and new product development (Mckinsey, 2010). Among the broader population, more than half of the population believe that sustainability is the management of environmental issues, such as energy efficiency, water conservation, greenhouse gases, green product development, and waste management. Other people believe that sustainability involves the management of governmental issues, such as meeting accepted industry standards, complying with regulations and maintaining ethical practices. Some people consider that sustainability deals with the management of social issues that include the working conditions of

employees and labour standards (Hutchin, 2001). Sustainability initiatives also help in short-term and long-term value creation. The concept of sustainability has gained importance and popularity over the past several years. Organisations' movement towards sustainability has emerged as a result of their growing concern regarding consumption of natural resources and increasing the population. Thus, sustainability programs or initiatives are capable of reaping benefits (Lozano, 2008).

2.3 KEY SUSTAINABLE STRATEGIES

In the last decades, the notion of a 'business case' for corporate sustainability has increasingly been used by the corporate sector, environmental organisations, and consultancies and so on, to seek justification for sustainability strategies within organisations. The business case is not a generic argument that corporate sustainability strategies are the right choice for all companies in all situations, but rather something that must be carefully honed to the specific circumstances of individual companies operating in unique positions within distinct industries. Successes in whole industries and at other companies are useful examples, but the case still has to be applied to one company at a time (Salzmann *et al.*, 2005). On a general level, the links between social, environmental and economic performance are a highly debated topic, in theory as well as practice (Schaltegger, and Lüdeke-Freund, 2012). However, theoretical and empirical research indicates that most companies have the potential for one or several business cases for sustainability. Various models have been proposed to analyse these links theoretically and empirically, whereas earlier work mostly assumed that the optimum level of environmental or social performance for a business firm may be just to achieve compliance with legal regulations (Schaltegger, and Lüdeke-Freund, 2012).

Crandall *et al.* (2014) noted that there are several initiatives that many organisations are adopting as a part of sustainable initiatives. These initiatives include a reduction in paper use, planting more trees, initiatives for environmental health and safety, planning economic growth, increasing profit margin and saving on costs, along with providing equal opportunity to employees, providing education, community growth (Gupta *et al.*, 2013). For accelerating sustainability, effective collaboration across the entire value chain of an organisation is required.

Sustainability development initiatives refer to the initiatives taken by businesses and people in their normal course of activities that focuses on the long-term benefits. For businesses, it is a form of development wherein the focus of the business shifts from the short-term profits to an approach which has long-term effects. These initiatives aim at establishing a balance among different considerations of the business, which includes environmental, social, and economic considerations. The sustainability initiatives taken by the businesses should not be in the form of the piecemeal approach, rather it should be in the form of an integrated approach that links with the decision-making process of the company (Brockett and Rezaee, 2012). This integrated approach helps the organisation in catering to the environmental and economic needs of the society in a better and more effective manner. Sustainability initiatives are specific; that is, they are concerned with specific businesses and specific projects. The steps that are adopted by the organisations focus on the sustainability of especially business taking into account the environmental and social needs of the community in which the business is operating.

Sustainability initiatives in business refers to the environment friendly practices that are adopted by companies to become more sustainable. These initiatives are designed to reduce the company's ecological footprint, which may include practices which result in

reduction of the waste produced by the company, unethical environmental practices, and pollution. The sustainable initiatives may differ from industry to industry but are more specific to particular companies. This signifies that there is no specific sustainable initiative that can apply to all companies; rather every company has to make certain modifications for the generalised sustainability initiatives to work in their benefit (Roosa, 2008).

From the perspective of Laughlin and Andringa (2007), corporate governance is widely being applied in monitoring corporate activities, such as the impact on society and the environment. Over the past few decades, organisations and stakeholders have taken into account the labour rights, environmental impact, and reported on social and environmental measures. Corporate governance helps organisations with managing and controlling business and is considered the main component for reaching economic efficiency. At present, corporate sustainability reports are the mainstream business activities. In order to ensure that the business is sustainable and operating in the right direction, corporate governance is essential. Corporate governance should assure investors regarding return on their investment and also ensure ethical behaviour and accountability (Krechovska and Prochazkova, 2014). Corporate sustainability is the organisation's ability through its governance practices that positively influence the environment, society and economic development.

In a similar context, Aras and Crowther (2012) added to this view, stating that corporate governance is an effective initiative to ensure business sustainability. Effective corporate governance indicates fulfilment of societal practices and norms along with communities' development through initiating knowledge enhancement and career growth opportunities. It is summed up on the basis of the triple bottom line concept that sustainable

development places emphasis on people, profit and planet management as their management aids towards the fulfilment of responsibilities towards the environment, people, and the economy as a whole. It has also been generalised that good governance and sustainable development are linked closely with each other as governance includes integrated governance, strategy, and to put into practice integrated sustainability (Aras and Crowther, 2012). Altogether, sustainable management fulfils present and future generations' demands by respecting human interests and rights, for social or community development.

Rao and Kondo (2010) noted that several organisations have introduced recycling programmes that help in minimising carbon emission and in mitigating adverse effects on the business process. However, environmental sustainability is not only the way through which businesses make a difference, but they also initiate other sustainable practices so as to gain competitive advantage (Rao and Kondo, 2010). These initiatives or programmes include applying green supply chain management practices, using latest environmentally friendly technology that provides a competitive advantage and innovating new products and services along with considering the well-being of the organisation, communities, and all the stakeholders (Kibert, 2012).

Allen (2015) stated that organisations undertake several types of sustainability practices to remain responsible towards society, environment and country while also remaining profitable. Sustainability initiatives are usually concerned with conserving resources and conducting business operations in a manner that business sustains in the long-term. In the present competitive environment, sustainability practices that are largely being adopted by business organisations include innovative typology, such as technological advancements (Breat, 2009). Some common initiatives that are increasingly being

adopted and are used by organisations involve the use of fair trade, planting more trees, recycling activities, providing environment-friendly products, educating society, concern towards human rights, and economic prosperity.

Kuppusamy and Gharleghi (2015) stated that sustainability initiatives are primarily associated with environment-friendly practices; however, social and economic aspects are also a major part of these practices. Other sustainable initiatives include waste reduction, eliminating poor environmental stewardship, fulfilling the needs of society, and adoption of technology. Innovation is increasingly being recognised as an element that delivers societal and environmental sustainability in the business environment (Brennan and Grandison, 2012).

Fields (2016) noted that companies have started recognising the importance of waste management and they are adopting different initiatives for reducing, recycling and reusing the waste they produce. The sustainability initiative in this context includes organisations developing a recycling programme wherein an in-house program is designed for recycling products, such as fluorescent light bulbs, paper products, computers, monitors, supplies and electronics. The company receives help from their waste management vendors to design this programme to ensure that as much of the waste produced can be recycled as possible and used in the manufacturing and packaging processes. Moreover, the harmful chemicals used by the company while manufacturing are also substituted by greener and cleaner products. The company have also started trying to use non-chemical products and started providing training to its vendors for proper use, handling, and disposal of the chemicals. The company has also recognised the importance of small initiatives which include the use of energy efficient products that are registered and approved by government agencies to contribute to energy consumption.

Eweje and Perry (2011) indicated that for introducing sustainability initiatives in an organisation, it is necessary to introduce sustainability principles in the organisational working first. The principles will be helpful for the company in ensuring long-term economic growth, social sustainability, and ecological sustainability. Companies adopt the eco-efficiency approach for ensuring the sustainability which signifies describing the objectives of the organisation in relation to the environment. Under this initiative, the company focuses on delivering competitively priced products and services to its clients to satisfy their requirements and have better life quality. Through following this practice, the company can ensure the reduced impact on the environment and resource intensity. Along with offering customers competitively priced products, by anticipating their needs, companies design their production systems considering the environmental concerns at the same time. The companies also focus on increasing the productivity of resources by getting more production done with less energy and materials, extending the responsibility of the producers for the toxic waste produced and encouraging the transition to renewable resources for production in their environmental settings.

2.4 THE IMPACT OF SUSTAINABILITY INITIATIVES ON COMPETITIVENESS

Wolf (2014) noted that competitiveness is the effect of a policy on the ability of regulated entities to compete in the global market. A business can be competitive if it has the ability to provide better and cheaper products and services to the customers than its local and international competitors. The competitiveness of an organisation is associated with the business' long-run profit performance and can also be viewed as a firm's ability to sell or earn (Young and Dhanda, 2012). The environmental regulations in this context tend to motivate organisations to reduce pollution by making environmental laws which restrict

organisations' ability to pollute. The sustainability practices of an organisation have a positive impact on the competitiveness and financial performance of the organisation. When an organisation is committed to the environment and is socially responsible, it might provide several benefits to the organisation.

Henriques and Richardson (2013) noted that some of the benefits that organisations reap include improved operational performance, improved competitiveness, enhanced risk management and financial performance along with achieving a social licence to operate. Moreover, organisations, through sustainable practices and initiatives, are also able to achieve good or standard international industry practice. Through implementing sustainable practices in the organisation, a business can optimise the use of raw materials and energy along with minimising the adverse impact on the environment (Zhelezov, 2016). In addition to this, the organisations can also access reputational risks, interruptions or delays in project execution, legal claims and cost of environmental remediation. Practising sustainable activities helps the organisation in improving its market position and access new market. Moreover, it also increases attractiveness; thus, talented employees can be recruited.

Levy *et al.* (2014) explored that sustainability issues, such as environmental, social or economic issues, can affect the growth and development of a business in various ways. Therefore, strict rules and regulations need to be imposed on organisational activities along with closely monitoring the sustainability activities (Semen *et al.*, 2012). The term sustainability is largely being incorporated into business operations as some organisations connect it with profit making, some with environmental protection, and some link it with collaborating with communities. Sustainability is viewed as the driver that helps in organisational growth and also influences organisational performance (Marshall, *et al.*,

2011). Sustainability practices in an organisation help in managing the environmental, governmental and social issues and provide long-term sustainability to the organisation.

In support of the above arguments, Galpin *et al.*, (2012) added to the context stating that nowadays, organisations have started recognising the role and importance of sustainability in their work. It has gained popularity among society and a firm practising sustainability initiatives and aware of a role for the community is favoured by society members. Companies having better environmental, social practices and corporate governance in place become employers of choice and are preferred by most of the talented people, hence, giving the company a bigger pool for prospective employees. Moreover, such companies also have better access to finances, quality partners in the supply chain and become a supplier of choice for the customers to fulfil their needs and requirements. All these benefits serve as the competitive drivers for the company and drive the company to attain a competitive advantage over the rivals.

As per the views of Berns *et al.* (2009), sustainability initiatives in an organisation tend to assist the organisation in achieving its goals regarding the attainment of market share. These days, government agendas are more focused on maintaining and promoting sustainability in the economy. The organisations that follow sustainable practices in their operations are less likely to be affected by the regulatory changes made by the government. Moreover, the companies adopting the sustainability initiatives have the first mover advantage, and it becomes difficult for the competitors to imitate the sustainable practices in their settings. In addition to this, the other benefits provided by such initiatives include cost savings, innovation in the product designs, services and marketing activities, process and business model innovation, effective risk management, better relations with the stakeholders. Along with these added benefits, sustainability initiatives

provide an extra opportunity for the company to enhance its revenues and cash flows, thereby ensuring a positive image for the company and a sustainable competitive position in the market.

According to Brockhaus (2013), businesses following sustainability principles in their working realise the importance of cost reduction and operational efficiencies. These businesses are also aware of the fact that consumers will prefer their products and services more if they deliver exceptional quality products to them that do not have any harmful effects on society or the environment. Sustainable business practices help in eliminating various risks faced by the businesses in terms of social, environmental and governance risks and ensure cost savings by achieving resource and process efficiencies. Adoption of these practices helps organisations in improving their customer base and loyalty among customers by delivering them innovative eco-friendly products to cater to their needs. This improved customer base and vision to protect the environment helps companies in improving their market standing and competitive position.

Similarly, in the view of Blackburn (2007) in the contemporary business world, sustainability is needed to secure position and goodwill as an ethical organisation that performs well in alignment with norms and policies. It is summarised from the review of sustainability characteristics or features that sustainability is about managing problems through effective solutions like the issue of pollution is being managed through adopting green ecology concept or greener environment initiatives. Similarly, lack of skilled human capital issues or unsupportive workplace culture are being managed or resolved through initiating activities favourable for human resource or human capital development. This helps the organisations in enhancing their efficiencies in terms of operations and

processes thereby assisting in taking a better position in the market and being more sustainable.

Pilot (2014) stated that the public image of an organisation is dependent on the sustainability programmes that are initiated by the company. Organisations at present know that the customers have increased awareness regarding an organisation's responsibility towards the environment and society, which also impacts the buying behaviour and preferences of the customers. Sustainable practices help organisations in building a reputation in the marketplace, creating a positive work environment where the employees are valued. Thus, these practices lead to organisational success and growth (Flouris, 2016). It is investigated that all the organisations work for profit and wealth maximisation, but if the organisation desires for long-term sustainability, the organisation needs to contribute to the well-being of people and the environment.

According to Renton *et al.* (2011), adopting sustainable practices provides various opportunities to organisations and results in the growth and success of the company. Through sustainable practices, organisations are able to access the capital market, and it also results in enhancing the sales and profit. The adoption of sustainability practices and initiatives not only provides customer satisfaction but also results in employee satisfaction. Moreover, organisations are able to improve their reputation in the market and their risk management process along with decision-making skills (Krechovska and Prochazkova, 2014). Sustainability practices not only enable the organisation in improving its productivity and quality of products and services but also help in building healthy relations with domestic and regional authorities and other business enterprises.

Willard (2013) noted that a company with a sustainable practices background tends to attract talented employees. There is a notion that people prefer working with those companies which care for their employees, products, and community. Such companies have high talent retention due to their willingness to fulfil their social obligations. The employees are the most valuable assets of a company and good or aware employees are more likely to work passionately for the company. A company that has a good brand image and sustainable position in the market will attract employees and make them an integral part of its working. This will enable the managers to provide challenging tasks to the employees and motivate them to prove themselves in the organisation and get themselves recognised for their ideas will benefit the organisations and the society. With this, not only the employees will be satisfied but the company will have better ideas for continuing its sustainable practices.

Wang (2014) noted that organisations are adopting a five-dimension sustainability approach which has minimal adverse effect on the ecology. The five-dimension approach includes product design, supply chain management, operations, product stewardship, and stakeholders' communications. The first dimension of product design signifies eco-innovation which means that the companies are in continuous search of new materials and processes that will ensure that future products of the company have minimum impact on the ecology and provide a leading edge in the competitive environment. The supply chain management and operations component signify that the suppliers and the employees of the organisation are aware of the sustainable initiatives taken by the company and will provide their maximum efforts for the same. Product stewardship enables the organisation to focus on the end life which signifies that the products that are manufactured by businesses should be durable and should provide services for a long duration.

According to Rezaee (2015), organisations have started adopting the policy of recycling and reusing their waste materials for manufacturing their products and designs both for packaging and production. This has helped the company immensely in improving and enhancing their energy efficiencies and increasing their profits. Moreover, the investment made by the companies in sustainable innovative products as a means of sustainability initiative has helped the organisations in boosting their sales and revenues. These innovative products benefit the company in more than one domain which may be in the form of transportation, material use, water use or energy use.

According to Blowfield (2013), sustainability initiatives have a significant role in helping the organisations in achieving a sustainable position in the market for a long run. The basic form of sustainability that an organisation can adopt is showing intent towards the concept of sustainability. This signifies that the organisations should incorporate sustainability into their corporate strategies and the same should be reflected in their objectives and goals which will make it a priority for the organisations to carry out the operations in such a manner that leads to sustainability. Moreover, another initiative that an organisation can adopt is partnering with its employees; that is, training its employees about the significance of sustainability for the organisation and the environment. The organisation should share its ideas and welcome feedback and views from its employees about the resource conservation. This will help in creating a culture where everything is focussed on attaining sustainability for the organisation. It is necessary to reinforce the sustainability efforts in the organisation by framing energy conservation and effective waste management policies for the organisation.

According to Toth (2011), the green supply chain is another initiative that most organisations have adopted, and this practice has provided a huge benefit to organisations that have already implemented green supply chain management systems. A green supply chain involves several activities that integrate green purchasing in terms of suppliers, manufacturers, customers, and reverse logistics. A green supply chain helps an organisation in designing an environmental and economic based supply chain that helps in enhancing the environmental impact of the supply chain of organisations (Semen *et al.*, 2012). It is observed that the supply chain from logistics management to product design and delivery has a major impact on the environment, thus green supply chain management should be applied throughout the organisation to decrease environmental impact and drive value creation. When an organisation effectively implements a green supply chain in all its processes and changes the way it works with its upstream and downstream trading partners, it becomes sustainable for long-term (Asefeso, 2015).

According to Stoner *et al.* (2008), the use of solar energy as part of the green initiative has also been used by businesses on a large scale. The business units involving manufacturing processes have started using solar energy for generating heat and the energy required for the manufacturing processes. Use of renewable energy resources is also promoted by different countries' governments in order to reduce their overall carbon emissions and get a good standing in the carbon market. The companies having low carbon emissions or which are emitting a smaller amount of greenhouses gases are trading their carbon credits with the companies having higher carbon emissions. This not only helps in offsetting and balancing the carbon emissions but also helps organisations in earning more capital gains. Moreover, the company with a smaller carbon footprint is always favoured by society and tends to have a competitive position in the market, thereby ensuring greater sustainability for the business.

Polprasert and Koottatep (2007) noted that another sustainability initiative that has gained popularity in the past few years in businesses is the concept of organic recycling. This is a green initiative that is adopted by businesses to convert the waste produced by them into the materials and objects that can be reused. This strategy helps organisations not only save on the cost of materials but also has an ecological impact. It focuses on reducing the level of greenhouse gases and decreases the consumption of energy, and different form of pollution by making the materials and objects reusable. One of the significant examples of organic waste recycling is the Wilmington Organic Recycling Centre in North America which aims at helping individuals and businesses in reducing overall greenhouse gas emissions. The facility accepts 160,000 tonnes of organic waste every year and reduces a big amount of the greenhouse gases which approximately equates to the removal of 88,000 cars from the road (Baker, 2014).

2.5 CHALLENGES FOR IMPLEMENTING SUSTAINABILITY INITIATIVES

Allen (2015) stated that, although approaches to sustainability in organisations are largely being advocated by academicians and policy makers, there are numerous relevant challenges associated with the implementation of sustainability, which are often given lesser attention while aiming to pursue sustainable development. In this respect, there are various pertinent factors that challenge sustainability in organisations. These include employee awareness about sustainable business practices; lack of adequate knowledge of sustainability practices among business leaders; lack of expert and experienced personnel in the field of sustainable businesses; and the absence of a sustainable vision. Factors such as failure of the organisation to pursue a focused strategy or plan for sustainability and the passive role played by the government policy and corporate governance, which

can play a crucial role in guiding the organisations while pursuing sustainability also serve as major sustainability challenges for the organisations (Allen, 2015).

In the perspective of BDI (2002), the four key challenges of sustainability development in management primarily include: the ecological challenge (need to increase ecological effectiveness), social challenge (need to increase social effectiveness), economic challenge to social and environmental management (need to improve eco-efficiency and social efficiency) and lastly, the integration challenge (the need to integrate the first three challenges with social and environmental management in conventional economically oriented management). The literature asserts that the economic effectiveness, which refers to the accomplishment of the best possible economic outcomes and also implies that the classical entrepreneurial task that has significant relevance in the context of sustainable development. The figure presented below illustrates the four key sustainable challenges and their association with economic effectiveness and sustainable development (BDI, 2002).

The challenge of economic sustainability or ecological effectiveness emphasises that the emerging environmental issues, such as greenhouse effect, acidification, decline in biodiversity, over-fertilisation of water and soil, photochemical smog and destruction of the ozone layer, have confronted the businesses with the challenge of taking adequate measures and policy initiatives to make substantial reductions in the absolute scale of the ecological impact of their operations, manufacturing processes and other productions functions. Although it is not possible to avoid environmental burdens completely, considerable efforts can be made to minimise to the maximum possible limit within the prevailing framework (The Economist, 2008). This factor thus creates a number of pertinent challenges for the sustainable development of the organisation. The second key

challenge is related to social effectiveness and implies that the management encounters a major social task of managing people and organising activities, which requires dealing with a comprehensive range of factors, such as fairness, interregional and inter-temporal equality of rights and performance. In this regard, the social, economic and ecological concerns might also conflict with each other, and they can never be addressed considering the temporal and financial resources and scarcity of human capital. In respect of the social issues, the human management thus confronts the challenge of setting priorities while communicating with the key stakeholders through transparent public reporting and endeavouring to maximise the positive impact of the business and minimise the negative impacts by following a social management system (Danciu, 2013).

The challenge of economic sustainability to environmental and social management is the other key sustainability challenge for organisations. The literature explains that, while the traditional economic challenge was concerned with the need for raising the shareholder value and the profitability of the products and services, economic sustainability challenges are related to making social and environmental management as economical as possible (The Economist, 2008). As the aim of profit-oriented organisations functioning within competitive settings is required to focus on profits and revenues, the efforts for undertaking social commitment and environmental protection are always confronted with the challenge of increasing the shareholder value, which seeks to provide increased profitability- at least possible costs - by employing cost accounting and stakeholder value analysis. The sustainable challenge in this respect is thus related to social efficiency and eco-efficiency required to be a key economic focus of the organisations to achieve sustainable development (Danciu, 2013).

According to Bansal *et al.* (2016), the ecological challenge can create serious issues for organisations because of an expected rise in the raw materials, consumption of energy and an associated rise in the environmental issues. A number of industrialised countries have already exhausted the limits of their ecosystems, which generates the key challenge of a significant reduction in the consumption of energy and reduction in raw material consumption. Further, the literature also raises concerns regarding the social sustainability challenges, which require adequate approaches, such as incentive systems and employee volunteering, as key measures to undertake further improvements in the effectiveness and efficiency in management. The economic challenges, on the other hand, require more innovative accounting methods that are based on material flows and processes, such as eco-rating, stakeholder value analysis and environmental cost budgeting, as tools with huge potential to satisfy the future interests of the stakeholders. The literature further emphasises that the focus of sustainability initiatives must be based on integration, which refers to a coordinated approach to meet all the sustainability challenges by combining the conventional management with the management of the key aspects of sustainability and deploying an integrated sustainability management system. The literature also highlights that the business challenges for sustainability need to focus on collaboration, respecting the rights of aboriginal, sustaining sustainability programmes, measuring and reporting the sustainability activities, developing inclusive public policy and measures for climate change, creating long-term orientation and educating the customers for sustainability.

Puritt (2012) highlighted some additional sustainability challenges. In this respect, the literature explains that becoming a sustainable business requires senior level management in more responsible positions. This can be achieved by adding more pertinent sustainability goals into the personal objectives of senior employees to ensure that every

employee in the organisation is accountable for the sustainable contribution to the social, economic and ecological goals of the organisation. Employee engagement is the other challenge, which involves the need for a positive change to have higher chances of increasing employee engagement. The higher level of diversification in an organisation has made this a key issue for organisations. In this regard, the literature highlights the need for appointing individuals or creating teams to serve as stewards to drive positive change in the business, who can motivate the employees to be committed towards the organisation and provide them with more opportunities to participate in organisational decision making.

The need for introducing sustainable initiatives at the organisation involves considerable costs and thus creates a challenge for the organisation. In this regard, the literature explains that cost must only be considered as a short-term barrier because, in the long run, the implementation of sustainability programmes will increase the efficiency of business, which can save huge costs in the long run (Nemetz, 2013). The literature also asserts the need for adequate metrics to ensure that there is effective control and measurement of the management policies and practices implemented by the organisation, for which the literature emphasises the need for the application of adequate regulatory bodies to determine the elements to be measured and managed effectively with the help of realistic deliverables.

Analysis of the above literature review revealed that there has been no significant academic study or research undertaken on the sustainable development of Qatar. Therefore, it is crucial to investigate what are the key reasons for implementing smart and sustainable strategies in Qatari organisations? What are the key sustainable strategies that are currently being implemented in Qatari organisations to achieve the National vision

2030? And what key challenges do Qatari organisations face in implementing sustainable strategies?

2.6 QATAR SUSTAINABLE DEVELOPMENT CONCEPT

Qatar has been placing increasing emphasis on environmental conservation, management, and protection since the establishment of the Permanent Environment Protection Committee (PEPC) in 1981. The main objective of the PEPC was to provide a forum to discuss environment-related legislations and regulations. The PEPC has the power to develop environmental policy, draft regulations and legislation, conduct environmental assessments and monitoring, approve development projects and raise public awareness on environmental issues (GSDP, 2009; MDPS, 2017).

Qatar's Permanent Constitution stresses the importance of the conservation and protection of the environment in Article 33 which states that 'The State shall work to protect the environment and ecological balance so as to achieve sustainable development for the generations to come'. Notable institutional and legislative initiatives include the establishment of the Supreme Council for the Environment and Natural Reserves (SCENR) in 2000 followed by the Environment Law No. 30 in 2002, and the ratification of the executive regulations for this law in 2004. In 2008, the SCENR was upgraded to become the Ministry of Environment (MoE) (GSDP, 2009). The SCENR was initially a department under the Ministry of Municipal Affairs and Agriculture before becoming an independent entity. Its responsibilities include: developing and implementing plans to protect the environment; establishing principles for determining impacts on the environment; monitoring and documenting pollution episodes; developing and setting up emergency response plans; implementing measures to mitigate pollution impacts; conducting studies on the effects of pollutants and ways of minimising these impacts;

evaluating and approving environmental impact assessment studies for government or private sector projects; providing technical staff trained in the fields of environmental monitoring and pollution prevention; enforcing environmental laws and standards; collecting data on the state of the environment; supervising and controlling the import, transport, disposal and storage of hazardous chemicals; and implementing environmental awareness programmes (MDPS, 2017).

The increasing understanding and acceptance of the importance of environmental management for continued human progress has resulted in increased efforts to protect habitats and reduce biodiversity loss in Qatar. Qatar's National Biodiversity Strategy and Action Plan (NBSAP) was completed in October 2004 to promote the conservation of biodiversity, sustainable use of natural resources, and equitable sharing of the benefits of biodiversity in Qatar. The NBSAP contains eleven strategic goals that identify the most pressing biodiversity issues in Qatar. Each goal is supported by an action plan that is composed of a series of proposed short-term and long-term activities that can be developed into practical projects. Each goal is also followed by monitoring indicators and responsible institutions (GSDP, 2009).

In 2008, the SCENR was superseded by the establishment of the Ministry of Environment (MoE). Employees of MoE have the capacity to act as law enforcement officers in cases of contravention against the provisions of laws and regulations (GSDP, 2009). Several legislative decrees on environmental protection have been issued, the most prominent of which are Law No. 30 in 2002 and Executive By-law No. 4 in 2005 on environmental protection; Law No. 4 in 2002 on the hunting of birds and reptiles; Law No. 31 in 2002 on 'Radiation Protection'; and Law No. 19 in 2004 on 'Protection of Wild Fauna and Flora and its Natural Habitats'. Emiri decisions have also been issued calling for the

protection of the marine environment from pollution from ships and land-based sources (GSDP, 2009).

While there has been a steady evolution in the institutions handling environmental management in Qatar, limited institutional and human resource capacity, as well as gaps in relation to data and research, has constrained their effectiveness. Policy and regulatory controls have by and large not kept up with the nation's rapid development (GSDP, 2009).

Likewise, Qatar's Protected Area Action Plan (SCENR 2007) outlines the current status of protected areas, as well as a set of action plans to advance the protected area programme between 2008 and 2013. Qatar has five designated protected areas for terrestrial ecosystems and three for the marine environment. These include the newly designated Al Reem biosphere reserve, Al Thakira, Shahaniya, Khor Al Udaid, Al Weseil, Al Oraiq, Al Isheiriq and Al Mas'habiya. Together they comprise about 22 percent of the terrestrial area of Qatar. Shahaniya, Al Mas'habiya and Al Isheiriq were wildlife farms developed into captive breeding sites for endangered species.

Qatar is also a signatory to all of the major international environmental treaties and to a number of other international and regional conventions in support of environmental sustainability including the Basel International Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1995; and the Protocol for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1996 (GSDP, 2009).

However, while Qatar has moved quickly to ratify international conventions and establish regulatory and managerial bodies, progress on implementing sustainable development

plans has been slow. Qatar faces numerous challenges in its transition to sustainable development and putting theory into practice, especially on account of its institutional and human capacity constraints (GSDP, 2009).

2.7 KEY SUSTAINABLE DEVELOPMENT DRIVERS IN QATAR

Climate change, which is altering precipitation patterns, causing greater frequency of extreme weather events and raising sea levels, has been identified as the most pressing global environmental problem with potentially catastrophic consequences for human development. Moreover, GSDP (2009) noted that human actions have affected the natural environment, resulting in rapidly diminishing forests and coral reefs, increased consumption of scarce water and energy resources, desertification, the spread of invasive alien species, loss of biodiversity, and global climate change. Excessive exploitation of natural resources reduced them below sustainable levels such as overfishing and the degrading of aquifers. Also, pollution of air, soil, and marine environment affect human health and damaged natural ecosystems. Waste, especially industrial and hazardous waste generated by industry and the lack of appropriate treatment facilities, result in pollution of soil and ground water and affected human health. Additionally, land use change, resulting from urbanisation, conversion to agriculture, road construction, and human habitation that impairs the functioning of ecosystems is also one of the most significant drivers of environmental deterioration. If left unmanaged, the environment will continue to deteriorate, impeding efforts to achieve the Millennium Development Goals (MDGs).

Qatar, with its large hydrocarbon industries, is vulnerable to climate change impacts. The nation's total carbon emissions from fossil fuels have recorded a substantial increase over the last two decades. Without direct action to ameliorate the rising trend in emissions,

Qatar's carbon footprint can be expected to increase over the next decade, with potential long-term negative consequences for human development (GSDP, 2009).

Currently, non-renewable hydrocarbon resources are being used inefficiently in Qatar (Richer, 2009). Subsidising manufacturing by providing energy resources at below market costs results in overuse of the resource, decreased efficiency, fewer technological advances, and greater environmental degradation. Supplying water and electricity to Qatari residents for free and at heavily subsidised rates for non-Qatari residents also results in serious challenges for developing sustainable use of an already scarce resource. While subsidies may be useful for attracting industry and expatriate labour, it is at the expense of the environment, the health of citizens and ultimately at the expense of Qatar's future generations. Qatar therefore needs to review its existing policies to ensure that present levels and patterns of consumption are sustainable and resource productivity is within the country's carrying capacity (GSDP, 2009).

Addressing climate change is not only a cross-border phenomenon, but also a cross-generational challenge. As climate change is a long-term problem with cumulative outcomes, mitigation measures implemented today, no matter how stringent, may not appear beneficial within the lifetime of the present generation. Action must instead be taken on the basis of the longer-term interests of ensuring intergenerational justice (GSDP, 2009). Accordingly, mitigating climate change in Qatar requires well-coordinated global, regional, and local action to reduce causal factors, such as greenhouse gas emissions. Adaptation to the consequences of climate change is complex and needs to be addressed at all levels. Qatar's abundant oil and gas reserves offer a window of opportunity to make the transition to a post-carbon economy, to help develop and exploit environmentally friendly and energy efficient technologies, and to invest in sustainable

development. Changes in global markets will open up new opportunities for Qatar to take a leadership role in emerging fields, such as emission-reduction approaches, energy-efficient technologies, green buildings and financing of low carbon activities (Matthew, 2013).

Furthermore, demographic change, such as too rapid population growth, rural to urban migration and shifts in household economic status, tend to exert pressure on many elements in the environment. Additionally, failure to account for resource depletion may result in a misleading picture of economic conditions. Scientific and technological changes exert both positive and negative effects on environmental change: some new technologies can, for example, enable more effective pollution abatement, whereas other technologies may encourage overexploitation by increasing resource extraction efficiency. Institutional gaps, such as the malfunctioning or absence of political and regulatory institutions, lead to overexploitation of resources, and weak enforcement regimes that fail to deter damaging forms of extraction. Moreover, insufficient participation of key stakeholders in the planning and management of sustainable resource use reduces the effectiveness of policies, their implementation, and enforcement. In addition to the socio-political factors arising from differences in culture and social behaviour, which result in varying consumption, production patterns, and social change that produces unpredictable shifts in resource use. On the other hand, economic growth, which intensifies resource consumption, drives land use change, and generates waste – although rising incomes can also bring investments in environmental improvement and cleaner technologies (GSDP, 2009).

Increasing industrialisation and infrastructure development pose many challenges to Qatar's environment. Environmental concerns relate, inter alia, to water consumption,

marine and land degradation and carbon emissions. There are also concerns related to the country's exceptional population growth that has accompanied its rapid industrialisation and development (MDPS, 2017).

Qatar's population grew from about 422,000 in 1990, to about 617,000 in 2000, and then reached 1.4 million in mid-2008 – more than tripling its population size in just 18 years. Qatar's exceptionally rapid population growth, averaging 16 percent per year between 2005 and 2008, is virtually unprecedented historically and globally. Most of this growth is attributable to unskilled and semi-skilled labour migration from South Asia and Southeast Asia (notably Indians, Pakistanis, Bangladeshis, Nepalese, Filipinos and Indonesians) and other countries of the Middle East and North Africa. The major influx of predominantly male expatriate workers is placing increasing demands on land for housing and recreation, energy and water, waste disposal and sewage treatment and on infrastructure and services (GSDP, 2009).

Extensive dredging and land reclamation, especially in Doha, has radically modified that section of the coastline. Intensive building activity is creating a new central business district in which more buildings are currently under construction than are operational, and unprecedented demand has already resulted in unconventional water supplies (desalinated and treated wastewater) almost totally replacing conventional water supplies (from rainfall and groundwater) except for agriculture, which is rapidly depleting the remaining fossil water drawn from natural aquifers.

Achieving water security is a major challenge for water resource management in Qatar. Continued overexploitation of the fossil water reserves threatens the remaining reserves from saltwater intrusion, while overuse of ground water for agriculture is resulting in soil

salinisation and desertification. There is heavy reliance on desalinated water whose production has grown markedly in recent years. Desalinated water is energy-intensive and costly, and efforts need to be made to minimise its carbon emission and its threat to sensitive marine environments (GSDP, 2009).

Qatar's total carbon emission from fossil fuels is on the rise. Combating carbon emissions is crucial for limiting the negative effects of climate change, which has the potential to stall and reverse human development in Qatar, and impact other countries. There are five key transmission mechanisms by which this could take place: losses in agricultural production and food security; water stress and water insecurity; rising sea levels and exposure to climatic disasters; damage to ecosystems and biodiversity; and negative impacts on human health (UNDP 2007).

The challenges to the marine environment in Qatar include the global forces of climate change and the regional and local impacts of large-scale industrial development, sea transport and extraction of marine resources. It is also being threatened by the local effects of human activities, such as coastal reclamation projects, the introduction of invasive species and overfishing. The degradation of Qatar's marine environment will have implications for food security, human health and sustainable livelihoods for the present and future generations (GSDP, 2009).

Qatar is also suffering losses due to desertification, including the loss of plant productivity, biodiversity and soil fertility. Improved access to freshwater has allowed the livestock population to increase dramatically. However, the move away from a nomadic to a more sedentary lifestyle has also resulted in increased localised grazing pressure. Livestock grazing by camels, sheep and goats above the ecological carrying

capacity has resulted in the reduction of many plant species, changing the shrubland to the current relatively barren landscape and contributing to the disappearance of native species, such as oryx and gazelles (GSDP, 2009).

2.8 SUSTAINABLE DEVELOPMENT STRATEGIES IN QATAR

A sound environmental management framework in Qatar is essential for building a modern state as well as for laying the foundation for a sustainable environment. Qatar needs to develop an integrated set of sustainable development indicators to provide reliable information for evidence-based decision-making (GSDP, 2009).

Policy options and institutional reforms should identify links between national, regional and global concerns. Qatar's efforts to protect the environment will not be sufficient on their own. Many problems faced by Qatar are also confronted by other countries. Regional and international alliances should be continued and expanded. Qatar has the capacity and resources to take a leadership role in spearheading best practices in sustainable development (GSDP, 2009).

Qatar is engaged in a range of broad-based educational reforms aimed at increasing attainment levels, skills and lifelong learning. Educational policy combines a mix of strategies focusing on quality issues and expanding choice and access, including through the establishment of internationally renowned universities at its Education City. It is also attempting to strengthen links between education and training and the needs of the labour market (GSDP, 2009).

Basic schooling for Qataris is now universal in marked contrast to the situation a generation ago. However, there is general acknowledgement that the quality of education

is not yet up to international standards, with Qatari students, especially boys, markedly lagging in mathematics and science subjects (GSDP, 2009b). Further, whilst school enrolments have increased substantially at the secondary level, there has been little change at the tertiary level, with relatively low male participation (MDPS, 2017).

2.9 THE QATAR NATIONAL VISION 2030

The Qatar National Vision 2030 (QNV2030) is built on four pillars aiming for a society that promotes justice, benevolence, and equality.

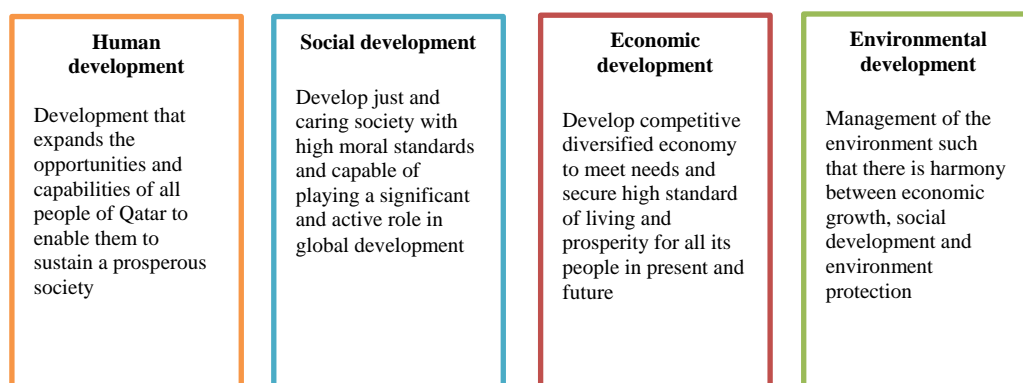


Figure 2.1: Four pillars of the Qatar National Vision 2030

Environmental Development

The QNV 2030's environmental pillar will become increasingly important as Qatar is forced to deal with local environmental issues, such as the impact of diminishing water and hydrocarbon resources, and the effects of pollution and environmental degradation, as well as international environmental issues, such as the potential impact of global warming. Assessing the severity of risks and dealing with anticipated changes will require mobilizing capacities and coordinating efforts to tackle problems that arise (GSDP, 2009). To achieve a balance between development needs and protecting the environment, including air, land, water and biological diversity, the QNV 2030 foresees the following environmental outcomes:

- Preserving and protecting the environment, including air, land, water and biological diversity, through:
 - An environmentally aware population that values the preservation of the natural heritage of Qatar and its neighbouring states;
 - An agile and comprehensive legal system that protects all elements of the environment, responding quickly to challenges as they arise; and
 - Effective and sophisticated environmental institutions that build and strengthen public awareness about environmental protection and encourage the use of environmentally sound technologies. These institutions will also conduct awareness-raising campaigns, employ environmental planning tools, and carry out environmental research.
- A comprehensive urban development plan for Qatar that adopts a sustainable policy with regard to urban expansion and population distribution.
- Encouragement of regional cooperation to put in place preventive measures to mitigate the negative environmental effects of pollution arising from development activities.
- A proactive and significant regional role in assessing the impact of climate change and mitigating its negative impacts, especially on countries of the Gulf.
- Support for international efforts to mitigate the effects of climate change.

Achieving environmental sustainability requires a mode of development which maintains a stable environment that predictably and reliably provides resources, such as clean water, food, energy and clean air, and that protects people from floods, droughts, and disease. The causes of environmental change are complex and interconnected and include direct as well as indirect factors that lead to deterioration of ecosystems.

Economic Growth

Markets do not adequately price or provide a wide range of environmental goods and services. Indeed, there are many kinds of environmental goods and services that markets do not provide at all (GSDP, 2009). For example, while markets in carbon are now developing, they do not stretch into the distant future. Carbon futures are now traded X years ahead, but not at longer horizons. The reasons for these “market failures” are manifold and include: an absence of property rights; problems of “non-excludability” and “non-rivalry” that diminish willingness to pay; information failures and uncertainty and technical difficulties in pricing and trading environmental goods. This combination of factors provides a rationale for government action that aims to better match outcomes with society’s preferences about the natural environment. Governments may also feel obligated to act if they consider that the preferences of the current generation risk injustice for future generations (GSDP, 2009).

Dealing with these issues is far from easy. Even if information was complete and would allow for the identification of an “optimal” strategy, there would still remain distributional concerns both within and between generations. Ultimately, there is no scientific resolution of what “economic sustainability” might mean, only one that is based on moral judgments and principles. One such principle, that is widely accepted, is that of intergenerational justice. Substitutability in production and consumption implies a general capacity to create well-being rather than preserve any particular resource. Preservation of the resource base does not imply, for example, that all exhaustible mineral and fossil fuel resources must be conserved, but rather the replacement of non-renewable resources that have been utilised with something else that is renewable, whether physical or human (Anand and Sen, 2000). Proceeds from a shrinking asset should be reinvested so that the yield from these investments compensates for the dwindling resource.

Social Equity

The ultimate goal of social development is to improve and enhance the quality of life of all people. It requires good governance, respect for human rights, fundamental freedoms and the rule of law, increased social and economic opportunities, gender equality, active involvement of civil society, and the promotion of respect for cultural diversity. Empowerment and participation, including the active participation of women, are essential for human progress.

Promoting and sustaining social development requires an orientation of values, objectives and priorities towards the well-being of all, and the strengthening and promotion of supportive institutions and policies. The pursuit, promotion and protection of these values provide the legitimacy of all institutions and promote an environment in which human beings are at the centre of sustainable development (GSDP, 2009).

Qatar's Human Development Progress

Human development is a major contributor to the achievement of sustained economic growth. It is both a means towards and an outcome of it. Expanding opportunities and capabilities, including through health, education, and the empowerment of women, provides the path for advancing sustainable development (GSDP, 2009).

The goal of sustainable development is to try to ensure intergenerational fairness which requires a balance between sustainability in the future and ongoing development. This fundamental principle is incorporated in the QNV 2030. The aims are for non-renewable

resources to be conserved, and renewable resources developed and substituted in the interests of the country, the region and the global community (GSDP, 2009).

Qatar has undergone a remarkable social and economic transformation within a period of less than a generation, advancing to 34th out of 179 countries in the Human Development Index. Until the current global economic crisis, Qatar enjoyed a period of unparalleled prosperity, with exceptional economic progress evident in the increasing standard of living of its people.

Qatar has achieved higher levels of performance in the gross domestic product (GDP) and education components of the HDI relative to the average of the Gulf Cooperation Council (GCC) countries, and is on par in terms of the health component. In 2006, the GDP Index for Qatar and the GCC Countries increased sharply, exceeding the average of the five highest HDI countries, due largely to the sharp increase in oil prices. Conversely, Qatar is lagging behind the five highest HDI countries, especially in terms of the education component as a result of relatively low enrolments in tertiary education. It follows that a significant advance in Qatar's HDI ranking will require achieving higher post-secondary enrolments, particularly of boys, who have much lower enrolment rates than girls (GSDP, 2009).

Progress in Qatar's human development has been made possible by the country's abundant hydrocarbon resources, especially its gas reserves, and by the wise use of the revenue from these resources. Rising oil and gas revenues, and accumulating surpluses, have been and continue to be used to fund a large and growing number of development projects in infrastructure, public utilities, health, and education. Qatar's real GDP has been growing at an impressive pace. Rising per capita incomes have not been

accompanied by widening income inequalities. Among Qatari households, the Gini coefficient at 0.293 is relatively low and similar to that of the Scandinavian countries. Qatar has put in place an extensive social and welfare support system for its citizens (GSDP, 2009).

2.10 CHALLENGES TO SUSTAINABLE RESOURCE USE IN QATAR

Despite Qatar's economic, social and environmental progress, sustainable development in the country is still facing a number of challenges (Al Nabit, 2017). A key challenge for Qatar in achieving sustainable development lies in translating the national goals of the QNV 2030 into concrete and workable programmes and projects, as well as establishing appropriate regulatory mechanisms and policies. Al Nabit (2017) noted that effective management to lead the 2030 agenda implementation and harmonisation with the national development strategy (NDS) is also a key challenge, in addition to the need for adequate human resources for such a big task and efficient communication strategy covering the staff of all sectors, and the challenges of stakeholder involvement in NDS implementation. The need for enabling legal environment is another key challenge (Al Nabit, 2017). Environmental policies must be based on solid research, sound scientific knowledge, and international norms and standards (Salman, 2009). How best to measure sustainable development and the environment have been the subject of international debate and the focus of some controversy. Achieving agreement on values, goals and actions to promote sustainable development is often difficult given the different interests of stakeholders.

2.11 SUMMARY

This chapter has presented a thorough review of the literature in the area of sustainability and policies and tactics implemented by the Qatari government relating to its sustainability strategy. The chapter discusses the concept of sustainability, strategies, challenges and impact of sustainability strategies on competitiveness. From the review of different academic studies, it is generalised that sustainability is an important concept for all business organisations to ensure continuous growth and development in the present and future arena. Focus on sustainable development from the past to the present has greatly shifted from environmental and economic development to human capital development through strategic management and effective governance.

Moreover, sustainability emphasises meeting whole community or stakeholders' interests through well-organised practices. In particular, regarding the concept of sustainability, it is also identified that sustainability relies on different aspects, including continual improvement, decision-making, participation, governance, and knowledge enhancement and information. Continual improvement is linked with sustainability with respect to fulfilling emerging needs in the present environment. Decision-making and participation in the context of sustainable management promote human resources competency and efficiency. The aspect of knowledge enhancement and information leads to developing people's awareness with current and new concepts that stimulates their ability to become knowledgeable and innovative. The governance aspect of sustainability development supports fulfilling requirement with respect to accountability, transparency, and efficiency.

From the above discussion, it can also be concluded that several types of sustainability initiatives are taken by organisations, which include green initiatives along with

programmes that benefit society and employees of the organisations. Some of the sustainability initiatives discussed above are green supply chain management, purchasing fair trade products, educating society, innovation and adoption of new technology. In addition to this, it is also analysed from the above discussion that sustainability practices have a positive impact on an organisation's performance, as it improves the reputation of organisations while also enhancing the capability to innovate which ultimately results in gaining competitiveness. Analysis of the literature review revealed that there has been no significant research undertaken on the sustainable development of Qatar.

The state of Qatar government developed 'Qatar National Vision 2030' that provides the basis for meeting its long-term objectives by setting up new sustainable development policies. The QNV 2030 implementation brought together existing and brand new governmental policies through National Development Strategies that were spread over two periods i.e. 2011-2016 and 2017-2022. This has led to a reduction of unsustainable patterns of production and consumption.

CHAPTER 3 : A REVIEW OF LITERATURE ON SMART CITIES, KNOWLEDGE MANAGEMENT AND BUSINESS MODEL INNOVATION

3.1 INTRODUCTION

This chapter presents a thorough review of literature in the area of smart cities, knowledge management (KM) and business model innovation for sustainability. Therefore, various related aspects have been covered and this also includes theoretical and practical examples by using authentic and contemporary sources. This chapter concludes with a summary.

3.2 LITERATURE REVIEW ON SMART CITIES

The McKinsey Global Institute (MGI) estimated that between now and 2025, the world's urban population will grow by 65 million people a year. The world population has been steadily concentrating in cities. A massive rise in this percentage took place from slightly more than 50 percent in 1950 to more than 75 percent of the EU population being located in urban areas in the year 2010, which has been forecast to increase to about 85 percent within the next 40 years (Caragliu *et al.*, 2011). Similarly, according to the World Bank Group, 2 billion people lived in developing country cities in 2000; by 2050, that number will grow to 5.5 billion (Walder, 2015). This urbanisation is a tremendous move; meeting the needs of this changing demographic will be a challenge (Bouton *et al.*, 2015). The population density of cities is vital for the environment, innovation, economic development, and so much more (Walder, 2015).

Cities traditionally function like magnets. Social, cultural, and economic networks attract more and more people to urban areas, because people have an almost intrinsic need for

such networks (Cities Today, 2017). This represents growing challenges in terms of land use, mobility, use of raw materials, energy and air quality, each of which affects the other. The solution lies in the smart use of infrastructure, of the region's specific capacities, and data (Cities Today, 2017).

Moreover, the rush to urban centres, particularly in emerging economics, is driven by a desire for a better life with more opportunities; as economics start to centralise in cities, so do people (Walder, 2015). Providing better services whilst meeting the significant requirements for business to retain globally competitive, in addition to the increasing pressure is to reduce our environmental footprint and achieving climate targets are the major challenges for cities around the world (Airaksinen *et al.*, 2016). Spending on enhancing energy efficiency, renovating, and improving infrastructure and on generating better living quality, and working environments, are vast. Then again, cities have inadequate financial assets for governance and amenities. As a result, they necessitate an efficient management of the limited resources (Kourtiti *et al.*, 2012).

The development of the concept of the smart city has been driven by the realisation of the increasing challenges of managing, controlling and constructing of cities. This has been further elaborated by the research work of Dameri (2013), which suggested that the need and cause of the development of the concept of the smart city have mainly been driven by the increasing challenges of environmental degradation values and issues that have been generated due to excessive urbanisation. The argument of Albino (2015) was convincing enough that the concept of smart cities today is the concept of the advanced business sector. In today's 21st century world, the concept of smart cities is more reflected by the interest that the business sector has drawn related to the intervention of information and communication technology and its implementation in the construction

and development of infrastructure. Several studies have made efforts to define the concept of smart cities. The concept explained by the study conducted by Townsend (2013) suggests that smart cities can be defined as the places where the information technology is integrated with infrastructure, architecture, and daily life objects including the individuals in order to address the challenges and issues that are associated with social, economic and ecological values. Another compact and detailed definition was suggested by Caragliu (2009) who defined smart cities as when investments are made in human and social sectors, such as in social capital, traditional (transport), and modern (ICT) that in communication infrastructure. This has been to achieve sustainable economic growth in improving the quality of life by means of effective management of natural resources with the participation of government. The argument of Neirotti (2014), in explaining the concept of smart cities, was also convincing enough that smart cities can be characterised as the extensive use of information and communication technologies in the urban domain, which has primarily focused on various domains that assist cities to make better and more efficient use of their resources. Section 3.3 reviews the concept of sustainable cities.

3.3 THE SUSTAINABLE CITIES

Before explaining the concept of sustainable cities, it is necessary to understand the definition of sustainable development. According to the study conducted by Le (2015), sustainable development is development that considers the fulfilment of the needs and requirements of the present without affecting the ability or capabilities of future generations in order to meet their needs. This definition of sustainable development can also be easily understood by analysing the case of the Swedish government. The government of Sweden purposefully adopted the smart sustainable strategy by promoting its developed strategy “generational goal”. The government of Sweden handed over its

environmental policy to developing the next generation with a focus to solve major environmental problems because of increasing environmental and health problems.

The initiation and development of the concept of “sustainable cities” have focused on technical solutions for a more efficient urban metabolism. The research work of Kramers (2013) elaborated the concept of sustainable cities as the sustainability impact that occurs within the administrative boundaries of the particular city. The most generalized definition of sustainable cities can be sustainable cities are cities that are designed and developed with the consideration of social, environmental and economic impact, focusing on the existing population and resources besides affecting the population or generation and the resources of the next generation.

The one major reason that drives the concept of sustainable cities is the fact that cities, in order to make them self-sufficient, need to support life of its citizens, and need a place like a hinterland from which the resources can be utilised with the dissemination of the waste. Previously, places like hinterlands were generally located near cities. Previously, these activities were limited to allotted places such as hinterlands. However, increased globalisation, industrialisation and the increased share of good consumption has resulted in increased environmental and social concerns (Cook, 2013). This has been further elaborated by the research work of Höjer (2013), which suggested that the increased environmental impacts have scattered significantly over the globe. As a consequence, the environmental impact of the city is hard to delimit to the urban metabolism within the boundaries. In realisation of this, the concept of the sustainable city was developed with the focus on designing and construction of cities by considering the social, economic and environmental values. Section 3.4 explains the concept of smart and sustainable cities.

3.4 SMART AND SUSTAINABLE CITIES

The concept of smart and sustainable cities is an integrated concept of the three entities that are smart, sustainable and the city itself. Several previous studies have provided sufficient evidence for exploring the concept of smart and sustainable cities. In some of the identified definitions of a smart city, it has been suggested that sustainability is the only integral part of the notion of smart sustainable cities. However, the work of Neirotti (2014) provided an argument why the term sustainability is important in the notion of smart and sustainable cities. The research by De (2015) focused on explaining the concept of smart and sustainable cities and emphasised the link between the three entities of the term smart, sustainable cities.

Dameri (2013) argued that, to understand the concept of the smart sustainable city, it is necessary to better understand the concept of sustainability first. The sustainability of cities refers to the designing, constructing and development of infrastructure and other areas with the utilisation of technology by considering the social, economic and environment. This has further been explained by Edmunds (2012) which suggested that use of technology in the form of information and communication technology is referred to as the most important factor that has revived and empowered the concept of smartness and sustainability. This has been because smart technologies, such as the advancement in information technology, have provided cities with a chance to utilise technology and to develop such environmentally friendly and sustainable options that can reduce the environmental degradation factors.

Several previous researchers have made efforts to explore the concept behind smart sustainable cities. The research of Albino (2015) defined the concept of the smart sustainable city as the city that fulfils the definition of sustainability in terms of meeting

the needs and requirements of its present inhabitants. Furthermore, the definition of smart sustainable cities does not allow cities to compromise on the ability and potential of future generations and individuals in order to preserve their needs. Furthermore, the definition of smart sustainable cities also allows cities to exceed the local or planetary environmental limitations. However, research by Cocchia (2014) suggested that the information communication technology sector is assumed to be one of the most influential factors that play an instrumental role in delivering smart and sustainable cities. Section 3.5 reviews the sustainable urban development and sustainable cities.

3.5 SUSTAINABLE URBAN DEVELOPMENT AND SUSTAINABLE CITIES

Urbanisation is the shifting of people from rural areas to urban areas. This can have both positive and negative impacts on the urban development of cities. There are several challenges that policymakers face when there is a large population living or willing to live in the urban areas. This is mainly because of the lack of facilities in rural areas that force people to shift to urban areas. One major issue associated with increased urbanisation is that resources like land and energy are being overused. Out of the 17 sustainable development goals (SDGs) developed by the United Nations, around eight to nine goals are directly or indirectly related with the reforms that the UN wishes to see in urban areas (United Nations, 2018). This indicates the importance of sustainable urban development to the overall sustainability of the society.

According to the United Nations (2018), 55 percent of the world's total population is living in urban areas and which is expected to increase by 13 percent by the year 2050. Clearly, this indicates that most of the population is created because of the activities in urban areas and in order to develop a sustainable environment, it is important for individuals and businesses mainly to ensure sustainable urban development. This has also

been the reason why people from different fields have shown interest in working on sustainable urban development (Höjer and Wangel, 2015). Several researchers and academic students have keenly worked on sustainable urban development, policymakers have expressed their concerns on increasing urban pollution and are devoted to addressing sustainable urban development. Private businesses have also started introducing technologies and practices that promote sustainable urban development (Hult, 2013).

Considering the increasing urbanisation and the need for sustainable urban development, the United Nations have also aimed to promote urban development to ensure sustainability (Estevez *et al.*, 2016). According to the United Nations (2018), goal number 11 of the 17 SDGs aims at improving the living conditions in cities by using eco-friendly means of transport. Goal number 12 emphasises reducing land pollution that is created by industries. Goal number 8 stresses the promotion of alternative sources of energy, like solar and wind, and also focuses on equal employment opportunities. The attention of all the concerned authorities illustrates how important the role of sustainable urban development is in the overall sustainability of society and a healthy environment. From the above discussion, it is crucial to investigate the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda. Section 3.6 explains the concept of knowledge management.

3.6 LITERATURE REVIEW ON KNOWLEDGE MANAGEMENT

The most sustainable organisations are looking at themselves and their future through the lens of the 'five capitals model' of natural, human, social, manufactured, and financial capital (Costanza, 2001). At the same time, evidence continues to mount and demonstrates that corporate social-environmental performance is strongly associated with financial and marketplace success (Wagner and Schaltegger, 2004). However, scarcity of

knowledge and expertise in the context of smart and sustainability is, and will continue to be, a huge challenge for many organisations regardless of whether they are in the private or public sector.

In fact, sustainability issues, such as climate change, require organisations to engage with their extended stakeholders and their communities. In addition to this, organisations also need to craft and deploy new sustainable business models to reduce environmental, social and financial risks of their daily business operations. This often calls for the creation, use and exploitation of new knowledge. Therefore, knowledge resources must be properly captured and shared to provide an environment for well-informed decisions. An effective management of knowledge associated with sustainability will help leaders, managers, and change agents to better understand how to craft and implement various smart and sustainable strategies for their organisational competitive advantage.

According to Nonaka and Takeuchi (1995), knowledge is a dynamic process that involves personal beliefs being justified in line with the ‘truth.’ Meanwhile, KM involves using intellectual processes to acquire and process raw data to produce information. According to Plato (427-347 BC), knowledge is perception, true judgment and justified true belief (Anand *et al.*, 2010). All of this information is placed into structures that embody knowledge (Saint-Onge, 1996).

It is widely recognised that knowledge is an essential strategic resource for an organisation to retain a sustainable competitive advantage. Therefore, managing knowledge has become significant for today’s organisations to meet changes and challenges. Specifically with respect to the construction industry, Yu *et al.* (2013) highlighted the complexity associated with the knowledge-intensive environments of the

construction industry where cumulative identity of experiences and knowledge differ daily across engineers, projects and companies.

Knowledge is a vital resource for construction-oriented organisations. In construction projects, knowledge is scattered, and the pool of knowledge could be lost if there is no proper channel for the knowledge created during the construction phase, for re-use on other projects (Kasimu *et al.*, 2013). The knowledge can be divided into two categories, known as tacit knowledge and explicit knowledge. Tacit knowledge is normally defined as personal knowledge which is difficult to formalise, written down, explained and described. By contrast, explicit knowledge is easily to formalise and describe, which means it can be easily transmitted between people (Nonaka, 1994).

From the empirical literature, it is apparent that there are two types of knowledge: explicit and tacit knowledge. Explicit knowledge may take the form of data or involve expressing formal or systematic language, specifications, scientific formula or user guides. By contrast, tacit knowledge cannot be seen, expressed or measured because it is experience-based and subjective. As such, it cannot easily be communicated to somebody else and nor is it simple to encode (Polanyi, 1966; Nonaka, 1994; Nonaka *et al.* 2000). Two methods can be applied when dealing with tacit knowledge: technical and cognitive. Technical knowledge is concerned with expertise, informal skills and know-how that is developed from experience over an extended period of time but cannot easily be communicated via formal channels. Meanwhile, cognitive knowledge comprises mental models, schema and beliefs that are unquestioningly assumed to be true (Nonaka and Takeuchi, 1995).

In the same vein, Hariharan (2015) supported this view, defining tacit knowledge as normally managed by experts, due to the difficulty of documenting and sharing it with others. From a broader perspective, Gerami (2010) also shared the same opinion, pointing out that this type of knowledge is normally in people's minds, obtained through their experiences.

Contrasting with tacit knowledge, explicit knowledge is a more formal and could be transferred and managed by words, numbers from different sources such as books, manuals, journals, data bases and others (Steven *et al.*, 2010). However, Suresh, *et al.* (2017) explained there are different forms of knowledge mentioning them as tacit, explicit, hard, soft, tangible and intangible. Nevertheless, the majority of authors just recognise KM in two common classifications. Shah *et al.* (2014) established that tacit knowledge can be divided into two categories, cognitive and technical. The cognitive is created by working models of the surrounding world, in which the mind plays an important role because it creates and manipulates all the interpretations.

The cognitive elements can comprise paradigms, beliefs, and viewpoints which are used by the mind to creates pattern and perceive and define the environment. Nonaka (1994) pointed out that a person recognises and interprets the surrounding environment through the patterns of the cognitive knowledge and technical knowledge is based on of know-how, abilities and techniques that apply to a specific situation.

McEvily and Chakravarthy (2002) acknowledged that tacit knowledge is specific and complex, as once it is developed inside the organisation, it starts to generate long lasting advantages because this type of knowledge is too difficult to imitate. The organisation can expand their knowledge base through the application of existing knowledge in the

company, along with the new one (Szulanski, 2003), allowing the organisation to absorb the internal and external knowledge and mix them with the pre-acquired knowledge, and creates new knowledge (Cohen and Levinthal, 1990).

Even explicit knowledge can be involved. This can be combined with internal knowledge which may result in new and exclusive knowledge (Zack, 2002). Therefore, KM can be seen as a tool in order to enhance organisational performance with many academic and practitioners advocating the organisational benefits of KM including delivery of projects with quality, shorter design and production times, customer and staff satisfaction and market leadership (Carrillo and Chinowsky, 2006; Suresh *et al.*, 2017).

Alavi and Leidner (2001) defined KM as the systematic process of acquiring, organising and communicating knowledge - both tacit and explicit - of organisational members so that others may make use of it to be more effective and productive. Davenport and Prusack (1998) stated that KM is an existing resource for organisations much like their human resource management, information systems and organisational management. This particular definition is derived from human resource management and information systems.

Van der Spek and Spijkervet (1997) stated that KM involves generating, storing, disseminating and retrieving knowledge. It is apparent that the terminology overlaps in many areas. For instance, Swan *et al.* (2000) referred to 'using' and 'sharing' knowledge, whereas Tiwana (2002) used the terms 'utilisation' and 'sharing.' Meanwhile, Davenport (1994) referred to KM as the practice of capturing, disseminating and using knowledge effectively.

Von Krogh *et al.* (2000) grouped KM impact on organisational performance into three broad categories: risk minimisation, efficiency improvement and innovation. Risk minimisation is closely linked to identifying and holding onto the core competencies that the organisation has. In most construction organisations, people have been recognised as key holders of valuable knowledge. KM can minimise the risk of losing valuable knowledge by identifying, locating and capturing what is known by individuals and groups of employees that is critical for an organisation's survival. KM can also impact people's learning, adaptability and job satisfaction (Becerra-Fernandez *et al.*, 2004). For example, KM can facilitate employees' creativity and group effectiveness through informal and formal socialisation.

In the view of Birasnav (2014), knowledge management is a practice similar to other management practices. It has become an important element for organisations as it helps in achieving a competitive edge by improving the capabilities of the firms. In addition to this, knowledge management includes the sharing of knowledge which takes time and while sharing organisational information, it is important to have trust before sharing information. Therefore, the knowledge management system is being used by a different organisation to store the information, share it and make the work faster.

Ruggles (1997) noted that not all tools are computer based but much emphasis is placed on the electronic tools due to their dynamic capabilities, quick evolution, and organisational impacts. He does not differentiate the term KM techniques and technologies whereas he terms it as KM tools. Davenport and Prusak (1998) asserted that KM tools are more than information technology; they are about the people who add value by transforming static data into meaningful information and knowledge by mixing it with their own experience and interpretations. Therefore, Davenport and Prusak (1998)

acknowledged that KM techniques and technologies are mutually dependent. In this study, KM techniques and technologies are not differentiated. This is because in most scenarios, techniques and technologies are interdependent and support KM activities such as knowledge mapping, knowledge capturing and knowledge sharing.

Massingham (2014) asserted that KM tools are able to amass data from various sources and classify, integrate and codify these data. In addition, Massingham (2014) suggested that these tools make it possible to retrieve and reveal knowledge and can also be employed in order to disseminate knowledge among staff. Pfeffer *et al.* (2013) stated that KM tools are technologies that facilitate KM sub-processes such as codification and knowledge transfer. Alternatively, Massingham (2014) suggested that the terms ‘KM tools’ and ‘KM techniques’ are interchangeable and believed that KM techniques are simply the means through which knowledge is managed using tools. The lack of consensus in the empirical literature therefore poses a question regarding what the practical differences and similarities are between tools, technologies and techniques. From the above discussion, it is crucial to investigate the key KM strategies in the context of smart and sustainable strategies currently being implemented in Qatari public sector organisations. Section 3.7 reviews literature on innovative business models for sustainability.

3.7 LITERATURE REVIEW ON INNOVATIVE BUSINESS MODELS FOR SUSTAINABILITY

According to Geissdoerfer *et al.* (2018b), business models can be defined as “simplified representations of the value proposition, value creation and delivery, and value capture elements and the interactions between these elements within an organisational unit”. However, since there can be several representations of the same organisational unit,

perceptions of the term must be considered that assume an underlying abstract concept that is characteristic of the entity - analogue to capabilities, resources, or strategies, which can be documented in different ways without the document becoming the underlying concept. Not fully considered can be definitions with reduced scope that assume identity of the business model with one of its elements, for example, the revenue model.

Academic and practitioner interest in sustainable business models has grown rapidly. When the concept was first conceived, its main purpose was to put companies into the service of the transformation to a more sustainable economic system and to provide leverage for integrating sustainability considerations into organisations and helping companies to achieve their sustainability ambitions (Stubbs and Cocklin, 2008). Today, the notion of sustainable business models is increasingly seen as a source of competitive advantage (Porter and Kramer, 2011). Thus, it could be argued that the sustainable business model concept might eventually supersede the business model concept, much like sustainable competitive advantage has superseded competitive advantage.

What the definitions in the literature have in common is that they see sustainable business models as a modification of the conventional business model concept, with certain characteristics and goals added to it; and they either 1) incorporate concepts, principles, or goals that aim at sustainability; or 2) integrate sustainability into their value proposition, value creation and delivery activities, and/ or value capture mechanisms.

The literature describes different subcategories, archetypes, or generic strategies for sustainable business models, like product-service systems, base of the pyramid, or circular business models. These types have additional characteristics. For example, circular business models do not only create sustainable value, employ pro-active multi-

stakeholder management, and have a long-term perspective, but also close, slow, intensify, dematerialise, and narrow resource loops (Bocken *et al.*, 2016; Geissdoerfer *et al.*, 2018a). However, because of potential trade-offs between these additional characteristics and the characteristics that qualify a sustainable business model, there may be cases that represent only the subcategory without being a sustainable business model. This could, for example, be caused by efficiency gains of a new technology that exceed the environmental benefits of closing the loop for an old technology, or negative consequences of going circular for the working conditions of employees (Geissdoerfer *et al.*, 2018a). Section 3.8 explains the concept of business model innovation.

3.8 BUSINESS MODEL INNOVATION

According to Geissdoerfer *et al.* (2018b), sustainable business models can be defined as business models that incorporate pro-active multi-stakeholder management, the creation of monetary and non-monetary value for a broad range of stakeholders and hold a long-term perspective. Business model innovation is a stream in the work on business models, and some authors of the latter assume it to be an implicit part of their conceptualisation.

The concept is investigated to understand and facilitate the analysis and planning of transformations from one business model to another. The capability for frequent and successful business model innovation can increase an organisation's resilience to changes in its environment and constitute a sustainable competitive advantage (Geissdoerfer *et al.*, 2018).

Definitions refer to business model innovation as a change in the configuration of either the entire business model or individual elements of it, either as a reaction to opportunities or challenges in the organisation's environment or as a vehicle for diversification and

innovation. Consequently, the concept's main fields of application have been in corporate diversification (Ansoff, 1957), business venturing and start-up contexts. Based on the described business model innovation examples, four generic configurations of business model innovation can be distinguished. These comprise start-ups, business model transformation, business model diversification, and business model acquisition.

Lindgardt *et al.* (2009) stated that at least two business model elements have to change for an innovation to qualify as a business model innovation. However, the thresholds for changes in a company's activities to qualify as a change in a business model element remain unclear - for instance, when a product innovation constitutes a new value proposition. Thus, it remains conceptually underexplored under what circumstances, for example, product innovation, service innovation, or changes in the supply chain qualify as a business mode innovation. Section 3.9 explains the business model innovation for sustainability.

3.9 BUSINESS MODEL INNOVATION FOR SUSTAINABILITY

Commonly accepted explanations consider that business models refer to the logic of how a firm does business, and explain how the firm creates, delivers and captures value (Magretta, 2002; Teece, 2010). However, there is no general agreement on the concept of business models. Evans *et al.* (2017) noted that empirically grounded classifications of business models are still scarce and adopt two perspectives: classification schemes with no explicit criteria, and theoretical typologies including ad hoc criteria based on prior theories in economics, strategy and entrepreneurship.

Spieth *et al.* (2014) suggested that the business model concept goes far beyond simple storytelling of how a firm does business and has a potential to provide a holistic

perspective of the firm's activities. Teece (2010) suggested that the design of business models enables the reconfiguration of business capabilities to adapt the firm to the changing business environment. Business models are seen as a vehicle for innovation and a necessary means for commercialising technological innovations, as well as a subject of innovation, e.g., open innovation, collaborative entrepreneurship, the business model itself as part of the intellectual property (Teece, 2010; Zott *et al.*, 2011; Evans *et al.*, 2017).

Evans *et al.* (2017) noted that, in the search for greater adaptive capacity and sustainable ways of doing business, novelty, creativity and positive innovation are bound to play a crucial role. Sustainability innovations refer to novelty not only in technology, but also in processes, operating procedures and practices, business models, systems and thinking. Researchers from different disciplines (economic sociology, innovation, history, technology studies) have attempted to explain business model innovation for sustainability from various perspectives. Existing studies can be structured into organisational, inter-organisational and societal levels (Boons and Lüdeke-Freund, 2013). Sustainability innovations require more integrated thinking and the reconfiguration of several business aspects such as capabilities, stakeholder relationships, knowledge management, leadership and culture.

Schaltegger and Wagner (2011) reflected on sustainability innovations as those envisaged to make real and substantial improvements by developing superior production processes, products and services, and by exercising strong market influence and social or political influence. Stubbs and Cocklin (2008) highlighted that business model innovations for sustainability tend to be ad hoc and neither systematic nor systemic. The generation of sustainable business model is multidimensional and complex, hence there are few known

successful cases (Hart and Milstein, 2003; Evans *et al.*, 2017). Section 3.10 explains the business model innovation for public sector sustainability.

3.10 BUSINESS MODEL INNOVATION FOR PUBLIC SECTOR SUSTAINABILITY

Osborne *et al.* (2015) noted that sustainable business practice in commercial markets has traditionally been equated with a healthy ‘bottom line’ profitability that provides a return for shareholders and/or owners. More recently, however, there has also been a growing awareness that, even in commercial markets, this is not sufficient. This has led to alternative models of sustainable practice including the triple bottom line and social audit and social accounting based one. Traditional business models in the private sector have been predicated upon the ‘single bottom line’ of organisational profitability as a measure of sustainability. However, this is an insufficient measure of sustainability for public sector organisations. Public service business models need to be more sophisticated and to be predicated upon public value rather than an organisational ‘single bottom line’ (Osborne *et al.*, 2015).

Lusch and Vargo (2014) have argued robustly that contemporary business requires business models embedded within a service-dominant logic – because this logic, predicated upon knowledge transformation, is the basis for value creation for any type of business. Governments can be role models in using these new types of business models and experimenting with them, showing other types of customers the benefits, and maybe participate in overcoming some of the barriers by customers who are deterred by the long-term contracts and large investment costs (Henriksen *et al.*, 2012). Moreover, the public sector can encourage the use of life-cycle models by demanding products where focus has been placed on green supply chain management or on cradle-to-cradle, by developing

selection criteria to be used in public tenders. Furthermore, the public sector can develop criteria for procuring recycled materials, instead of using virgin materials when, for example, buildings and roads are built. Focus can also be placed on designing for recycling, where products are designed to be separated to allow materials to be reused and recycled. The public sector can also encourage industrial symbiosis by developing criteria for the resource cycles of companies participating in public tenders.

The public sector has occasionally been described as incapable of innovation. Drucker (1985) stated that governments tend to maximise input rather than optimise production. However, the need for innovation in the public sector is perhaps more pressing than ever before (Axelson *et al.*, 2017). Despite the growing government interest in advancing public sector innovation, academic research is limited. Although some research on innovation challenges in the public sector literature adheres to political science and economics, the literature on strategic management and innovation is scarcely concerned with this empirical domain. Specifically, few strategic management perspectives explain how innovation efforts in the public sector differ from initiatives in the private sector. This is surprising because governments face a pressing need to reinvent themselves, particularly in situations of sluggish economic growth, increasing debt burdens and changing demographics (Axelson *et al.*, 2017). However, the business model literature has not yet been applied to the public sector.

Previous research has noted that innovations are often available to the public sector but remain un-diffused because governments might be more bureaucratic and unwilling to adopt new practices (Rashman and Hartley, 2002). In turn, efforts towards sustainability, efficiency and accountability within governments may result in less innovation. However,

relatively little research has examined the ability of the state to engage in innovation activities.

Bason (2010) suggested that it is not logical for the public sector to engage in innovation work because individuals usually lack both resources and incentives to develop or realise major innovation activities. In contrast to for-profit organisations, public organisations lack clear incentives for innovation, especially if failure is penalised more than success is rewarded (Wilson, 1989). The fundamental idea of public organisations, as Wilson (1989) stated, is thus to reduce uncertainty and introduce stability and routine and not to innovate. Hence, some have argued that public organisations are inherently incapable of innovation (Drucker, 1985). In other words, the state's role is neither that of an innovator nor that of an entrepreneur. Systemic perspectives, such as the business model concept, usually indicate that changes in any one component of the concept generate feedback loops that affect other components. Therefore, changes in one component may have ripple effects throughout a system, which makes changes inherently difficult to undertake and predict. For example, poor incentives to innovate and a limited market mechanism may generate a severe procurement challenge in a constellation of actors, including firms within a public sector that aim to undertake innovation efforts. According to Henriksen *et al.* (2012), the key challenges for public sector business model innovation include: large investments (long-term) tied up in products; complications with involving other companies in value-chain; internal company organisation; current accounting practices; traditional mind-sets; bonus systems for the buyer; long payback time for customers; uncertainty about savings for customers, and financial institutions; lack of capital for initial investments and for smaller projects since there is a competition for scarce capital with more traditional investments; lack of flexibility due to long-term contracts; lack of

financial and human resources; and lack of knowledge in companies and public authorities.

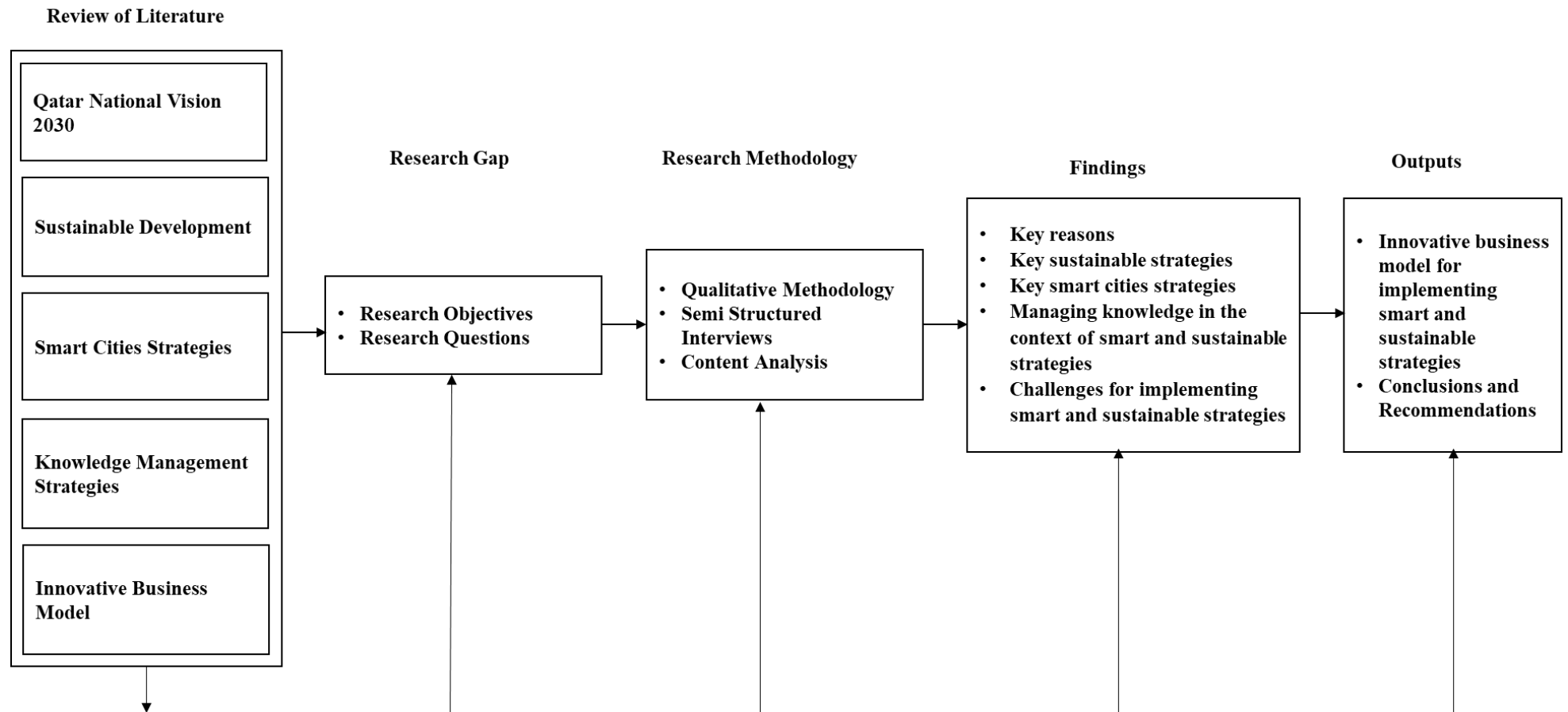


Figure 3.1: Overview of the research process

3.11 SUMMARY

This chapter has presented a thorough review of the literature on smart cities, knowledge management and business model innovation that relates to the current study's objectives. The chapter discussed the concept of smart and sustainable cities in detail along with the impact of urbanisation on environmental sustainability. The chapter found that digitalisation which is a key part of urbanisation can also have a negative impact on the overall sustainability of the country if not processed and managed efficiently. Merely allowing knowledge to reside within an organisation is insufficient to deliver success; rather, it must be actively managed. Figure 3.1 presents the overview of the research process. Various mechanisms can be utilised to manage knowledge in organisations. The knowledge contained within an organisation is both multifaceted and highly complex and spans the full range from tacit to explicit. Sustainable business model innovation is a relatively nascent field of research. Changes to business models are recognised as a fundamental approach to realise innovations for sustainability. The capability to rapidly and successfully move into new business models is an important source of sustainable competitive advantage and a key leverage to improve the sustainability performance of organisations. Public service business models need to be more sophisticated and to be predicated upon public value rather than an organisational 'single bottom line'.

CHAPTER 4 : RESEARCH METHODOLOGY FOR THE STUDY

4.1 INTRODUCTION

The purpose of this chapter is to set out the methodology employed in the current study. This includes specifying the approach to data collection, as well as the data analysis techniques that were adopted.

4.2 OVERVIEW OF THE RESEARCH PROCESS

The choice of research methodology is a crucial and difficult step in the research process (Walker, 1997). In this research, the research process was identified into three key phases within its flexible boundaries. The three phases are the literature review, research strategy and the output. The development of the research work started with the literature review.

Fink (1998) defined “a literature review as a systematic, explicit, and reproducible design for identifying, evaluating, and interpreting the existing body of recorded documents”. The analysis of documents pursues the aim of opening up materials that do not have to be created on the basis of a data collection by the researcher. Literature reviews usually have two objectives: First, they summarise existing research by identifying patterns, themes and issues. This way the literature review provides a starting point for research. Secondly, any contribution to research from conceptual or empirical work has to be enfolded against existing theories as a means of thought organisation and substantial justification (Brewerton and Millward, 2001). This helps to identify the conceptual content of the field and can contribute to theory development. One of the challenges associated with the literature review is that it is impractical to read everything. Therefore, only for emerging or narrowly defined issues it might be possible to provide complete

reviews. In this research, the review of relevant literature involved background study on sustainability, smart cities, knowledge management, and innovative business models. The study features a qualitative research method design, i.e., it used qualitative data collection and analysis techniques. The research outputs constitute results analysed in Chapter 5, Chapter 6, Chapter 7, Chapter 8, Chapter 9, Chapter 10 and Chapter 11. The aforementioned chapters are substantiated with relevant literature.

4.3 RESEARCH APPROACH

Naoum (2013) pointed out that research designs can be defined as; “plans that guide the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure”. Research design also can be defined as “an action plan for getting from ‘here’ to ‘there’ where ‘here’ may be defined as the initial set of questions to be answered and ‘there’ is some sort of conclusion (answers) about these questions. Between ‘here’ and ‘there’ may be found a number of major steps, including the collection and analysis of relevant data” (Naoum, 2013).

Naoum (2013) also stated that research methodology covers the understanding of the research and the strategy adopted to answer the research question. Additionally, it implies a system of obvious rules and procedures, which the study is based upon and against which claims for knowledge are evaluated. Research methodology can be defined as “the principle and procedures of the logical thought process which are applied to a specific investigation. On the other hand, a research method refers to “specific activities designed to generate data, for example questionnaire, interviews, focus groups, and observation” (Greener, 2008).

According to Harwell (2011), it is possible to characterize a study's methodology as qualitative; as quantitative; or as involving both qualitative and quantitative methods, in which case it is typically referred to as mixed methods. Identifying a study's research design is important because it communicates information about key features of the study, which can differ for qualitative, quantitative, and mixed methods. However, one common feature across research designs is that at one or more points in the research process, data is collected (numbers, words, gestures, etc.), albeit in different ways and for different purposes. Thus, qualitative studies are, among other things, studies that collect and analyse qualitative data; quantitative studies are, among other things, studies that collect and analyse quantitative data; and so on (Harwell, 2011).

Crotty (1998) described four key features to consider in research design: the epistemology that informs the research; the philosophical stance underlying the methodology in question (e.g., post-positivism, constructivism, pragmatism, and advocacy/participatory); the methodology itself; and the techniques and procedures used in the research design to collect data.

Qualitative research methods focus on discovering and understanding the experiences, perspectives, and thoughts of participants—that is, qualitative research explores meaning, purpose, or reality (Hiatt, 1986). In other words, qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative

researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Denzin and Lincoln, 2005).

Central to this inquiry is the presence of multiple “truths” that are socially constructed (Lincoln and Guba, 1985). Qualitative research is usually described as allowing a detailed exploration of a topic of interest in which information is collected by a researcher through case studies, ethnographic work, interviews, and so on. Inherent in this approach is the description of the interactions between participants and researchers in naturalistic settings with few boundaries, resulting in a flexible and open research process. These unique interactions imply that different results could be obtained from the same participant depending on who the researcher is, because results are created by a participant and researcher in a given situation (Harwell, 2011).

Qualitative research methods are also described as inductive, in the sense that a researcher may construct theories or hypotheses, explanations, and conceptualizations from details provided by a participant. Embedded in this approach is the perspective that researchers cannot set aside their experiences, perceptions, and biases, and thus cannot pretend to be objective bystanders to the research. Another important characteristic is that the widespread use of qualitative methods in education is relatively new, dating mostly to the 1980s, with ongoing developments in methodology and reporting guidelines (Denzin, 2006).

Quantitative research methods attempt to maximize objectivity, replicability, and generalisability of findings, and are typically interested in prediction. Integral to this approach is the expectation that a researcher will set aside his or her experiences, perceptions, and biases to ensure objectivity in conducting the study and the conclusions

that are drawn. The key features of many quantitative studies are the use of instruments, such as tests or surveys to collect data, and reliance on probability theory to test statistical hypotheses that correspond to research questions of interest. Quantitative methods are frequently described as deductive in nature, in the sense that inferences from tests of statistical hypotheses lead to general inferences about characteristics of a population. Quantitative methods are also frequently characterized as assuming that there is a single “truth” that exists, independent of human perception (Lincoln and Guba, 1985).

Trochim and Land (1982) defined quantitative research design as the glue that holds the research project together. Design is used to structure the research, to show how all of the major parts of the research project—the samples or groups, measures, treatments or programmes, and methods of assignment—work together to try to address the central research questions (Harwell, 2011).

Definitions of quantitative research design are complicated due to the fact that this term is often used to identify the experimental design reflecting the arrangement of independent and dependent variables associated with data collection (Harwell, 2011).

Quantitative methods have a long history, dating to at least the 1930s, that has produced strong professional norms that impact research activities, such as the criteria used to make funding decisions and decisions about the kinds of studies and results likely to be published (Harwell, 2011).

Generally, research design has moved from an almost exclusive reliance on quantitative methods to a more varied approach that includes qualitative research methods. As Lincoln and Guba (1985) pointed out, both qualitative and quantitative research methods

emphasize truth, consistency, applicability, and neutrality while taking different procedural approaches to assure quality (Harwell, 2011).

4.4 DATA COLLECTION AND ANALYSIS

Qualitative research is “an authority term covering an array of informative techniques which seek to describe, decode, translate or when come to relations with the meaning, of certain more or less certainly arising phenomena in the social world” (Van Maanen, 1979) which give rise to “detailed descriptions of events, conditions, and interactions between people and things providing depth and detail” (Patton, 1990).

Qualitative research is based on an interpretive paradigm and is exploratory in nature. This enables researchers to gain information about an area in which little is known (Liamputtong and Ezzy, 2005). The sampling method used in this study was purposive or non-probability sampling, whereby the subjective judgements of the researcher are used in selecting the sample (Remenyi *et al.*, 1998). Furthermore, the purposive sampling technique involves drawing samples that are both easily accessible and willing to participate in a study (Tashakkori and Teddlie, 2010). According to O’Leary (2004), non-probability sampling methods are used when there is a need to answer the “how” and “why” questions. Therefore, a purposive sampling technique was used in order to achieve representativeness. In this study, qualitative data was collected through semi-structured interviews. Semi-structured interviews provide some flexibility and are one of the ways to obtain a realistic picture of an individual’s view (McCormack and Hill, 1997).

According to Bernard (1998), a semi-structured interview question is best used when there is only one chance to interview the interviewee. The semi-structured interview question will assist with providing a reliable set of qualitative data. It also provides

understanding in developing a topic of interest that may abandon from the interview and develop a relevant and properly structured interview question. Generally, semi-structured interviews will be taped and transcribed for analysis. Interview questions can be prepared ahead of time and allow proper preparation before the interview takes place. A semi-structured interview also allows the interviewee freedom to express their opinions in their own terms. In this study, qualitative data was collected through semi-structured interviews. Semi-structured interviews provide some flexibility, and it is one of the ways to obtain a realistic picture of an individual's view (McCormack and Hill, 1997).

A total of 40 public sector organisations in Qatar were contacted from which 56 interviewees agreed to participate in this study. Firstly, the organisations were sent the invitation letter, which stated information about the research, the ethical aspects of conducting interviews and the benefits of participating (i.e. sharing the summary of the results). The study sample included directors, advisers and managers responsible for implementing Qatar National Vision 2030 as presented in Appendix A. The interviews lasted between 20 and 90 minutes. The format of these interviews was face-to-face, and the transcripts were recorded and supplemented with field notes as appropriate. These interviews were recorded with permission and supplemented with field notes. During interviews, visible evidence of sustainability-related activities in the interviewed organisations (e.g., posters, awards) was also noted. Documents, such as reports relating to sustainability initiatives, were also collected. Full, verbatim transcripts were produced to ensure nothing was omitted based on subjective filtering by the researcher. Audio tapes were frequently replayed to pick up additional data from voice inflection and demeanour, laughter and joviality, and other nuanced behaviour otherwise lost during transcription.

An important sample size issue in qualitative research involves saturation of information (Glaser and Strauss, 1967; Strauss and Corbin, 1998). Robbins (1994) noted that the suitable number of experts for qualitative research may range from 5 to 50. To ensure greater dependability and transferability (Creswell, 2014), a total of 56 professionals were interviewed from the Qatari public sector organisations. An important sample size issue in qualitative research involves saturation of information (Strauss and Corbin, 1998). Saturation is a term used to describe the point when no new insights or range of ideas are generated through adding more data. In this study, data was collected until no new aspects of smartness and sustainability issues were revealed. In this study, actual saturation of data occurred before the 54th interview. Therefore, only 56 interviews were conducted.

In a comprehensive assessment by Morison and Moir (1998) on the pros and cons of using software for coding, limitations seemed to outweigh benefits. When purported efficiency of data management and retrieval capabilities were weighed against the potential loss of “familiarity with the data engendered through repeated handling, reading and re-reading that is part of the analytical process itself distancing researcher from the data through mediation of computer software”. Therefore, it was decided that a better approach was to use paper, pen, and the capabilities of Microsoft Word.

The analysis of the interviews was undertaken using Content Analysis. The purpose of content analysis is to provide knowledge and understanding of the phenomenon (Downe-Wamboldt, 1992). Applications of content analysis show three distinct approaches: conventional, directed, or summative. All three approaches are used to interpret meaning from the content of text data and, hence, adhere to the naturalistic paradigm. The major differences between the approaches are coding schemes, origins of codes, and threats to trustworthiness (Kondracki and Wellman, 2002). In conventional content analysis,

coding categories are derived directly from the text data. With a directed approach, analysis starts with a theory or relevant research findings as guidance for initial codes. A summative content analysis involves counting and comparisons, usually of keywords or content, followed by the interpretation of the underlying context. The current study adopted a conventional approach to content analysis. Using content analysis enabled the researcher to include large amounts of textual information and systematically identify its properties, e.g., the frequencies of most used keywords in context by detecting the more important structures of its communication content.

Hsieh and Shannon (2005) noted that a Content Analysis is a method of research for subjective interpretation of the context of text through a process of system classification of coding and identification of themes or patterns. In the study, coding of the transcribed documents involved open coding of meaning units, that is, words, phrases, sentences, paragraphs, which essentially involved labelling concepts. The emerging concepts were mapped into themes. The unit of analysis adopted for this study was the Qatari public sector, and the embedded unit of assessment was the ‘individual employee’.

4.5 VALIDITY AND RELIABILITY OF RESEARCH

Miles and Huberman (1994) referred to validity with terms such as internal validity and external validity. Internal validity refers to the accuracy and trustworthiness of the information. That is, whether it represents the participants’ reality. In other words, internal validity addresses whether the findings are credible (Creswell, 2009). In this study, threats to internal validity were minimised through triangulation of data collection methods (interviews, internal and external documents) and verification of the initial thematic codes by participants, where they judged the accuracy of data collected, though not its conclusions. The researcher asked participants, after the interview, to review the

analysed data. Participant validation involved communicating key thematic codes to the original informant and asking them to confirm the accuracy of thematic codes. Having multiple sources of data in addition to the interviews (e.g., external and internal documents) also enabled the researcher to check for convergence. All key informants agreed that they had been recorded and interpreted accurately. Participant validation served to strengthen the trustworthiness of the study.

External validity explains how generic the research findings are beyond the cases used in the study (Yin, 2003). External validity has been an important issue and the number one subject of discussion when discussing the quality of qualitative research. Yin (2003) notices that critics typically claim that no generalising can be undertaken on the basis of a few cases, let alone a single case. As to the external validity, the results of this study remain limited in their generalisability, irrespective of the triangulation.

Traditionally, reliability means that a later investigator would be able to repeat the already conducted study in the same environment and receive the same results and draw the same conclusions (Yin, 2003). Thus, an important prerequisite for allowing future researchers to repeat an earlier study is a thorough documentation of the research implementation. In qualitative research, conventional measures of reliability (e.g., replicability) are not very applicable as the real world is constantly changing. Ensuring and demonstrating to others that “data generation and analysis have not only been appropriate to the research questions, but also thorough, careful, honest and accurate” becomes essential (Marshall and Rossman, 1999). In this study, the researchers have attempted to ensure the reliability of the study through a careful documentation of the data collection procedures and the questions the respondents were asked.

Mathie and Camozzi (2005), suggested preparing the research methodology means designing the tools required for each method that has been selected. For instance, if the research involves observation and interviews, it is required to develop an observation data sheet and interview guides (if it is a semi-structured interview) prior to going into the field. This is also the time to practise the skills that are needed to carry out the methods in use. Very often, a colleague can act as a ‘subject’ and the researcher can role-play methods prior to arriving on-site. This is especially useful if the researcher is not used to prior fieldwork. Discussion with others who have conducted similar research could also give the researcher useful insights into the practice of qualitative research.

In this study, the researcher entered as a novice using a qualitative research approach. Hence, prior to the field study semi-structured interviews were conducted with three academic staff members at the University of Wolverhampton. One of them was the Director of Studies for this research and the other two were lecturers. After listening to the recording of the interviews on numerous occasions, the researcher learned that she needed to improve her listening skills and to wait until the participant had completely finished what they were saying before prematurely interrupting with the next question. As the interviewees proceeded, the researcher also learned to be sensitive to the answers and probe in depth.

4.6 ETHICAL ISSUES

Since the nature of qualitative data is based on interaction between researcher and the participants, it can be challenging throughout the different stages of study. By considering qualitative data collection in a study, some ethical challenges must be taken into account. Qualitative data collected can be described as interpretive research where this method investigates why and how of a human being and the findings may be controversial if the

interpretation is incorrect and biased. Therefore, ethical guidelines were been implemented in order to deal with ethical challenges of qualitative studies. The first stage was submission of the ethical form to get approval from the University of Wolverhampton for this research. As far as the ethical form is concerned, it was approved to proceed to the next level of the research study. The participants were given information on the ethical guidelines as the relationship and the intimacy during the research would be treated as “private and confidential” (see Appendix B). The participants were informed that the control and ownership of the data belongs to the researcher solely for the purposes of this study.

4.7 THE DEVELOPMENT OF AN INNOVATIVE BUSINESS MODEL FOR IMPLEMENTATION OF SMART AND SUSTAINABLE STRATEGIES

The empirical findings from the previous stages of the study and aspects from the critical review of the literature were considered in the development of an innovative business model for implementation of smart and sustainable strategies for the benefit of Qatari organisations. In this study, during face-to-face interviews, interviewees were asked whether there was a need for an innovative business model for implementing smart and sustainable strategies in Qatari public sector organisations. Of the interviewees, overwhelmingly, 100% (56 of the 56) noted the need for an innovative business model for implementing smart and sustainable strategies. Therefore, an innovative business model for implementation of smart and sustainable strategies for the benefit of Qatari organisations was developed (see chapter 10 for more details). The developed model uses environmental, social and economic dimensions of sustainability as its foundation. The developed business model was validated with five senior professionals from five Qatari public sector organisations. These five senior professionals used for the validation were not part of the 56 interviewees conducted as part of the main study. The professionals had

over 10 years of work experience in the public sector management. The professionals had been informed by e-mail about the objectives of the research study and the aim of the business model. Also attached to the email was the developed business model. This e-mail was sent one week prior to the face-to-face interview so as to create an opportunity for the interviewees to review the developed model. The experts selected were required to provide comments on the developed model (See Appendix D).

4.8 SUMMARY

This chapter provided an overview of the research methodology and procedures used in the acquisition and analysis of empirical evidence used to determine how Qatari public sector organisations are embedding smart and sustainable strategies in order to achieve the Qatar National Vision 2030. The chapter also explains why and how qualitative methodology was adopted for this study. Content analysis was used to analyse the qualitative data. The results from the analysis of the qualitative data are discussed in Chapter 5, Chapter 6, Chapter 7, Chapter 8, Chapter 9, Chapter 10, and Chapter 11. The next chapter (i.e. Chapter 5) discusses the key the key reasons for implementing smart and sustainable strategies in Qatari organisations.

CHAPTER 5 : THE KEY REASONS FOR IMPLEMENTING SMART AND SUSTAINABLE STRATEGIES

5.1 INTRODUCTION

This chapter focuses on the key reasons for implementing smart and sustainable strategies in Qatari organisations. The results are based on the perceptions of the 56 participated interviewees. The findings are also substantiated with the relevant literature. In this study, interviewees were asked to list and describe the key reasons for implementing smart and sustainable strategies in their organisations through face-to-face interviews. This study revealed six key reasons for implementing smart and sustainable strategies in Qatari public sector organisations (see Table 5.1). In the order of importance, they are: Qatar National Vision 2030, improved decision-making, to reduce operating cost, to improve water efficiency, to improve transport infrastructure, and to develop safe and sustainable communities. Each of these key reasons is discussed in detail from section 5.2 to 5.7. Finally, section 5.8 summarises the key findings. In doing so, Chapter 5 addresses the first research objective, which is “to explore and document the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations” and the first research question, which is “what are the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations”?

Table 5.1: Key reasons for implementing smart and sustainable strategies in Qatari public sector organisations (N=56)

Sl. No	Key reasons for implementing smart and sustainable strategies	Percentage of interviewees cited (N= 56)
1	Qatar National Vision 2030	100% (56/56)
2	Improved decision-making	92% (51/56)
3	To reduce operating cost	82% (46/56)
4	To improve water efficiency	80% (45/56)
5	To improve transport infrastructure	75% (42/56)
6	To develop safe and sustainable communities	70% (39/56)

5.2 QATAR NATIONAL VISION 2030

In this study, overwhelmingly 100 percent (56 of 56) of the interviewees echoed that Qatar National Vision 2030 was the key reason for implementing smart and sustainable strategies in their organisations. In order to achieve the goals of the National Vision 2030 holistically and optimally, Qatari administration has laid particular emphasis on sustainability initiatives. In this regard, one of the first national sustainability initiatives launched by the administration was Qatar National Development Strategy (2011-2016), which was aimed at neutralising the foremost environmental challenges facing the infrastructural and manufacturing organisations of the country. This led to a number of smart and sustainable strategies that were focused on sustainable development of different private and public sector departments, all aiming at completely sustainable governance of different areas of the Qatari nation. Among the different initiatives, the Ministry of

Municipality and Environment of Qatar has deduced plans to reach complete sustainability in urban planning and environmental control.

The Qatar National Vision 2030 is primarily focused on four major aspects of societal and national development, comprising of social, economic, human, and environmental aspects of development. The human development pillar aims at empowering people to be able to support and sustain the growth in the country. For this purpose, a range of policies have been introduced for improvements in the field of healthcare, education, and the workforce in general. Reforms have been introduced in the post-secondary education sector, and cultural, scientific and intellectual research areas. Increases in opportunities have been made through training, academic support and academic achievement for the citizens to increase their calibre.

Under social development, the key policies have focused on building a secured and stable society, preservation of the heritage of Qatar, and enhancement of its Arabian and Islamic identity, promotion of a spirit of tolerance, empowerment of women and access to high-quality services to fulfil the needs and desires of people. Measures have also been undertaken to ensure the development of Qatar on an international platform by focusing on its active role in the Arab League, Gulf Cooperative Council and the United Nations. In respect of the economic pillar, the Qatar National Vision 2030 has focused its policies on diversification and growth of non-energy sectors and transformation into a knowledge-based economy. The key milestones in technological advancement and financial development have been the Qatar Science and Technology Park and Qatar Financial Centre.

The environmental pillar largely focuses on the establishment of harmony between economic and environmental growth. In this regard, its policies focus on keeping on the industries through legislation and environmental assessment.

5.3 IMPROVED DECISION-MAKING

In this study, 91 percent (51 of the 56) of the interviewees noted that improving decision-making was a key reason for implementing smart and sustainable strategies in their organisations. The advances in digitalisation have made access to information much easier. For instance, individuals of a smart and sustainable city have the facility to access and evaluate the huge amount of material that can be used for several purposes like research and development. According to the key factors identified by the Intelligent Community Forum (2018), the key characteristics of a smart city include improved connectivity, knowledgeable and talented workforce, effective digitalisation and innovation. All these sources help individuals and businesses in enhancing their decision-making skills.

The implementation of smart and sustainable strategies enhances use of information technology. Making effective use of information technology is only possible through connectivity. In the information age of today, humans, rather everything, in a city can be connected. Humans are connected to each other with the help of advanced handheld devices which are owned by almost everyone living in smart cities today as used while traveling by Andrade (2007). Such a stronghold of connectivity synchronises the behaviour of human in today's society. Other than humans, the smart city may also contain businesses, government and infrastructure that are connected. Information flow from one to another may improve decision-making. For example, the communication of business activity to the government by businesses themselves will in turn help the

government make their plans and arrangements. These include taxation, subsidies, infrastructure development and other arrangements made by the government as in the article by Spoehr *et al.* (2012). These arrangements which will once be communicated to businesses will help them make their decisions accordingly. As a result of communication and information connectivity, the workforce will have extra knowledge to apply while working; this will lead to innovation throughout the environment.

5.4 TO REDUCE OPERATING COST

In this study, 82 percent (46 of the 56) of the interviewees noted that the reduction of operating cost was a key reason for implementing smart and sustainable strategies in their organisations. Generally, saving on operating costs enables organisations to obtain benefits by simplifying the management structure, reusing recycling resources, and improving production efficiency to seize the opportunities for smart and sustainable development. Obviously, this will not only increase the organisational value, but also improve the positive public reputation and maintain competitive advantage (Renukappa *et al.*, 2013).

Ever-increasing water costs and shortage of human resources are forcing Qatari public sector organisations to reduce their operating costs. At the same time, the increasing cost of fossil fuels, security of supply, and reducing carbon emissions through improved process efficiency are forcing organisations to implement cost-saving related sustainability initiatives. Eco-efficiency and socio-efficiency are the basic components of sustainability (Savitz and Weber, 2006). For example, eco-efficiency initiatives allow the firm to reduce the amount of resources used to produce services, which in turn decreases the organisation's operating cost while decreasing its environmental impact. Also, it will coordinate environmental activities of the firm to achieve greater organisational

efficiency and effectiveness. The underlying theme of eco-efficiency is simple: pollution is waste, and waste is inefficient and represents a misallocation of scarce resources.

5.5 TO IMPROVE WATER EFFICIENCY

In this study, 80 percent (45 of the 56) of the interviewees noted that improving water efficiency is an important reason for implementing smart and sustainable strategies in their organisations. Namely, there is an interaction between energy conservation and water resource protection. Cities across Qatar are continuously attempting to solve the issue of water scarcity through the use of innovative technologies (new/novel technologies and emerging technologies) and innovative approaches to water management. Among these innovations are the improved processes and systems for managing flow and improving metering for water distribution systems/networks. Smart water systems make use of digital technology to aid in saving water consumption/usage, reducing costs, and increasing the reliability and transparency of water distribution networks. An example of an application of smart water systems is the overlaying of physical pipe networks with data and information networks (Polson, 2013).

5.6 TO IMPROVE TRANSPORT INFRASTRUCTURE

In this study, 75 percent (42 of the 56) of the interviewees noted that improving transport infrastructure is another important reason for implementing smart and sustainable strategies in Qatar. Transport and overall infrastructure are a key benefit of executing a smart city agenda. According to the study of Kamers *et al.* (2014), the models that are a part of the smart city provide information about the routes and destination of public transports. These models also allow easy processing of payments like online payments to facilitate the citizens. The transport will comprise of eco-friendly technology that will

reduce pollution. Similar to improved transport facilities, improving infrastructure will also be a key benefit of smart cities. According to Schaffers *et al.* (2011), three key elements of a potential smart city are governance, innovative economy and the infrastructure of the city. Washburn *et al.* (2009) also emphasized highly the infrastructure and stated that it is an important part of a smart city.

As mentioned under the previous heading, the development of good systems of transport may also improve the environment of the city. Another characteristic of the rail and road services, which provide overall benefits to the system, are that it helps connect remote areas of the city, which may not be accessible otherwise. This would in turn provide opportunities to people living in the suburbs to join the other developed parts of the city. Another matter concerned with the infrastructure involves better banking services which support the economic activities and business carried out in the city as discussed in the article by Marchand (2016). Additionally, smart technologies can be used at traffic signals to ensure smooth flow of traffic, not only automated but traffic monitoring should be done to ease the traffic flow from one part of the city to other. The systems for efficient parking and earning parking fees may also be developed in the city, leading to a reduction in the traffic woes of citizens.

5.7 TO DEVELOP SAFE AND SUSTAINABLE COMMUNITIES

In this study, 70 percent (39 of the 56) of interviewees noted that developing safe and sustainable communities is another important reason for implementing smart and sustainable strategies in Qatar. Digitalisation can play a major role in achieving the sustainable development goals (SDGs) set by the United Nations. Digital technologies, such as online health services, robots, can be very helpful to nations in achieving a sustainable environment (Seele and Lock, 2017). According to Heemsbergen (2016),

digitalisation has created new and effective ways of determining, observing, collaborating and governing sustainability in a much more transparent manner. According to the author, it has been a positive step in attaining sustainability. Digitalisation has also played an important role in exploring improved possibilities for research that could be more productive for the future (Shah *et al.*, 2015). Hampton *et al.* (2013) also stated that digitalisation has made the analysis of big data easier, which has a positive impact on the overall sustainability of the environment.

Technological advances and the transparency system within a city ensure that a smart city is a safe place to live in. Technologies like CCTV cameras, gunshot and original license detectors are few of the examples of how technology can ensure security in a smart city. According to Meronen (2017), the smart city has several characteristics, and one important characteristic is that it enables safety and security of the communities residing within the city. The city has better healthcare and education facilities that protect the communities from all sorts of troubles. Surveillance cameras and wireless connectivity between the police and security forces (including private security companies) may lead to effective policing by the state and a more secure environment in the whole of the smart city. Security personnel may be better able to perform their duties. Access points in society may be equipped with retina scanners or other forms of positive identification of humans which cannot be forged or duplicated so that monitoring of human movement within the city can take place using equipment as described in the article by Kozma *et al.* (2012). Similarly, identification of vehicles can be done through scanning identification stickers on windcreens of cars moving on the road network expanded throughout the city.

5.8 SUMMARY

Six key reasons for implementing smart and sustainable strategies in Qatari public sector organisations have been discussed in this chapter. They were: Qatar National Vision 2030, improved decision-making, to reduce operating cost, to improve water efficiency, to improve transport infrastructure, and to develop safe and sustainable communities. Milne *et al.* (2006) noted that sustainability has always been difficult to assess directly, since it is an abstract and multidimensional concept. Therefore, organisations face significant challenges in taking the first steps towards implementing smart and sustainable strategies. For instance, understanding the underlying concepts of sustainability, changing the attitudes of employees and customers, as well as new policy or legislation, which encourages the uptake of the sustainability agenda, is a challenge. To improve sustainability performance, therefore leaders have to recognise and better understand the concept of sustainability.

Overall, the following inferences and implications can be drawn:

- A complex mix of government, economic, social, and environmental forces drive Qatari organisations to implement smart and sustainable strategies.
- Before organisations embed sustainability initiatives, they need to understand and recognise key drivers which are pushing them towards implementation. Therefore, understanding the drivers for implementing smart and sustainable strategies is important.
- More effective integration and knowledge sharing within and across smart and sustainable strategies and projects are required. Establishing a collaborative network with both internal and external stakeholders would be pivotal and should be addressed thoroughly.

- Understanding the level of importance of the different drivers can help organisations prioritise and align processes and resources accordingly to ensure success. This could assist decision makers to develop smart and sustainable strategies based on the drivers.

Chapter 5 has addressed the first research objective, which is “to explore and document the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations” and the first research question, which is “what are the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations”? The next chapter (Chapter 6) discusses the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030.

CHAPTER 6 : SUSTAINABLE STRATEGIES ADOPTED IN THE STATE OF QATAR

6.1 INTRODUCTION

The purpose of this chapter is to present the key sustainable strategies that have been implemented in Qatari public sector organisations. The results are based on the perceptions of the 56 participated interviewees. The findings are also substantiated with the relevant literature. In this study, interviewees were asked to list and describe key smart and sustainable initiatives that have been implemented in their organisations through face-to-face interviews. This study revealed ten key initiatives under the umbrella of sustainable strategies that have been implemented in these Qatari public sector organisations (see Table 6.1). In the order of implementation, they are sustainable water management strategies, renewable energy strategies, sustainable sports strategies, resources efficiency strategies, electric vehicles (EVs) strategies, Industry 4.0 strategies, smart healthcare strategies, sustainable workforce development strategies, smart village strategies, and sustainable mobile apps. Each of these key initiatives is discussed in detail from section 6.2 to 6.11. Finally, section 6.12 summarises the key findings. In doing so, chapter 6 addresses the second research objective, which is “to investigate and document the key sustainable initiatives needed to effect change that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030” and the second research question, which is “what are the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030”?

Table 6.1: Implementation of sustainable strategies in Qatari public sector organisations (N=56)

Sl. No	Sustainable strategies implemented	Percentage of interviewees cited (N= 56)
1	Sustainable water management strategies	93% (52/56)
2	Renewable energy strategies	89% (50/56)
3	Sustainable sports strategies	86% (48/56)
4	Resources efficiency strategies	80% (45/56)
5	Electric vehicles (EVs) strategies	75% (42/56)
6	Industry 4.0 strategies	71% (40/56)
7	Health care strategies	64% (36/56)
8	Sustainable workforce development strategies	57% (31/56)
9	Smart village strategies	48% (27/56)
10	Sustainable mobile Apps	45% (25/56)

6.2 SUSTAINABLE WATER MANAGEMENT STRATEGIES

In this study, 93 percent (52 of the 56) of the interviewees noted that their organisation currently implemented sustainable water management strategies. The Earth has a closed water cycle system, which is being distorted, particularly in urban areas, requiring engineered water recycling solutions. These solutions create closed water cycles at local and regional levels and can create high quality water for reuse (Dolnicar and Schafer, 2009). The key drivers are surrounding more effective use of Treated Sewage Effluent (TSE) and water conservation, KAHRAMAA, along with other government agencies and

the Qatar Green Building Council (QGBC), are investing in social and cultural change, educating the population of Qatar to consume less potable water. The head of sustainability for the QGBC, explains “We need to explore whether this is the time to consider the deployment of new technologies that can substantially improve our built environment” (QGBC, 2013).

One of the main concerns about the use of TSE is water quality and the effect on public health. Toze (2006) described the main concerns as being the variety of microorganisms, including pathogens, viruses, bacteria, protozoa and helminths, which all carry infectious disease. These organisms are removed from wastewater during the recycling treatment process. The other concern relates to endocrine disrupting chemicals (EDC's) and pharmaceutically active compounds (PhAC's). Toze (2006) explained that these compounds are present in very low concentrations. It is accepted that secondary treatment of sewage effluent removes the majority of these compounds from the wastewater (Wang *et al.*, 2003).

Nancarrow *et al.* (2008) explained that recycled water schemes are initially perceived by the community to be acceptable; however, as the solutions get closer to home, human contact or ingestion, then more people are less likely to use the water. This is supported by Marks (2006) and Bouwer (2000), who found that reuse of sewage effluent is not readily accepted, while Po and Nancarrow (2004) highlighted the “yuck” factor as a barrier to water reuse. They explained that people perceive water from natural storage (lakes) and rivers to be clean and suitable for use, even though they may be heavily polluted.

Many of the public areas in Qatar are covered with grass and local Qatari plants to maximize visual appeal, while minimizing maintenance and replantation costs. Ground

conditions are typically sand rock and the topsoil is a medium silt that can easily form an impermeable layer when it gets wet and then dries quickly in the hot, arid climate. Irrigation water systems implemented throughout Doha are predominantly overground drip feed, sprinklers, and manual handheld hose systems. The main risk associated with these systems is the health risk from both airborne particles and waterborne risks to the labour force employed to construct and maintain these areas. The simplest irrigation system is a handheld hose with a spray nozzle to control the flow of water and prevent excessive runoff. Automatic drip irrigation is effective at supplying pre-regulated amounts of water directly to the soil with reduced water loss due to evaporation or runoff. It is particularly good for mulched areas because it can directly soak the soil without washing away the mulch.



Figure 6.1: Automatic drip irrigation system

Automatic sprinkler systems offer the benefit of programmable controllers and can cover large areas. The time of watering is important to reduce the evaporation rate and runoff. If runoff occurs, then the number and length of watering times may need adjusting to ensure effective usage.

Sprinkler systems create an aerosol or droplets that can be easily inhaled by landscape workers and the general public, particularly during moderate to high wind speeds. Wind also creates water pattern distortions and increases evaporation losses (Hamdy. 1992).

Incorporating soil moisture sensors to override automatic watering systems is effective as they can detect moisture at the level of the root system. They are more exact in measuring how much water plants are receiving and offer greater water management. However, they can be complicated to install and require regular management (wateruseitwisely.com, 2015). An alternative method of irrigation is to provide water from a shallow subterranean storage vessel. Passive Capillary Irrigation is a method of growing plants and grasses using an inert porous medium to transport water and oxygen to the root zone by capillary action. Water can be supplied on demand. Permavoid is a recycled polypropylene geocellular storage system (Wilson *et al.*, 2005) that, when installed with a wicking geotextile, makes it possible to regulate the water needed to provide optimum irrigation of the root zone. Permavoid cells have a 95 percent void ratio along with a high compressive strength and are joined together using a patented tapered jointing system to create a horizontal structural raft (Wilson *et al.*, 2005).

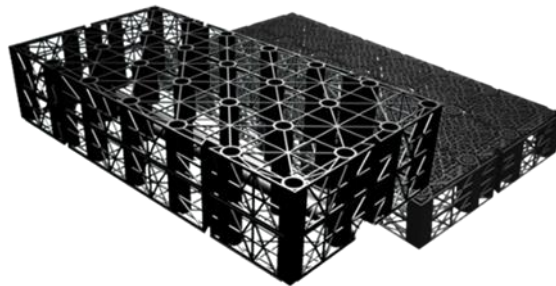


Figure 6.2: Permavoid cells system

Permavoid is manufactured in depths of 150mm and 85mm. The hollow structural columns within the Permavoid geocellular units are filled with an absorbent rockwool, which draws up water that is stored within the unit. The Permavoid raft is covered with a proprietary wicking geotextile that supplies water on demand across the structural raft to irrigate the growing medium.

Flora and vegetation planted within the growing medium still have access to minerals and nutrients, minimizing the requirement for fertilizers and helping to develop a healthy root system. Capillary rise within the Permavoid system and overlying soils can be considered in two parts. The first element is that provided by the system itself, whereby water is transported via the capillary columns to the top of the Permavoid layer and into the overlying wicking geotextile, assuring that at this level the geotextile is constantly 55-65 percent saturated with water.

The second part of the capillary rise is achieved within the overlying soils, where the moisture content diminishes with vertical migration to a point at which the rise ceases. In the Netherlands, the limit of effective capillary rise is determined as the point at which less than 2mm of water is delivered per day over the area that irrigation is required.

The Permavoid geocellular system can be linked to the TSE pipework network using simple flow control devices; it is wrapped in an impermeable geomembrane to the base and sides to form a horizontal subterranean ‘tank’, the top is then covered with a wicking geotextile. The wicking geotextile is a heavy duty, non-woven, needle punched geotextile manufactured from a blend of polyester fibres formulated to absorb water to irrigate mineral substrata (Polypipe, 2015). It also acts as a root barrier. The irrigation of areas can be easily monitored and regulated to suit local ground conditions and annual weather patterns. TSE can be used more effectively, evaporation rates are reduced, and it is easier to regulate the amount of TSE required. One of the prominent results to date is that the roots grow down towards the water source and are stronger and more robust. This is a major benefit regarding maintenance of large public areas in sandy soils.

The Permavoid cells are only partly filled with TSE and incorporate an air reservoir which provides oxygen into the growing medium and the root zone. Plant respiration is known to increase in warmer temperatures and providing oxygen within the root zone is very important. Until they acclimatize, grasses and vegetation produce increased levels of carbon dioxide, (CO₂) into the atmosphere. Using indigenous grasses and vegetation and/or pre-acclimatized plants allows plants to establish more quickly and reduce the amount of CO₂ emitted (King *et al.*, 2006). Another benefit is that the geocellular tank can also collect rainwater during infrequent precipitation periods as part of the storm water management system, collect TSE from overirrigation and, if designed correctly, can collect wash-down water from hard standing areas. The system is suitable for shallow use within trafficable pavements and, if designed in conjunction with a range of hydrocarbon removal techniques, would allow rainwater recovery tanks to be installed below car park areas and adjacent to highways (Newman and Puehmeier, 2008). Recovered rainwater could then be used to help supplement the TSE irrigation requirements of Public Realm areas. The geocellular system is installed in shallow applications, avoiding issues with high water tables and contaminated ground and it can also be installed on soils with poor ground bearing properties (Wilson *et al.*, 2005).

The Qatar National Vision for 2030 recognised water stress as severely impacting on food security and identified that a new series of reservoirs will be constructed to provide a minimum of seven days' worth of fresh water (desalinated) as a backup for desalinated water supply. This equates to 1.9 billion gallons of new freshwater, provided from desalination techniques and/or importing from other countries. By 2011, KAHRAMAA was producing 265 million gallons of desalinated water per day. If water consumption trends were to continue, then increases in excess of 5 percent per annum would continue through and beyond 2020. The Qatari government published a National Water Act in

2016 together with a system of integrated regulation. KAHRAMAA, as part of the Act, will invest in piping and leak-sealing operations to reduce network water losses from 35 percent to 10 percent. A new desalination plant is to be constructed at Ras Laffan that will be capable of producing an additional 67,000 gallons of potable water per day and will be connected with the proposed reservoir project. The Act also introduced the mandated use of water-efficient appliances to help reduce domestic water consumption (Mansfield, 2012). The use of TSE for irrigation in Doha has been accepted by the government and engineers alike; however, current practices of delivering treated effluent may not be effective due to climatic conditions. TSE is treated to a tertiary level, where it can be used for groundwater regeneration, animal fodder irrigation, lagoon top up and landscape irrigation. This level of treatment is required to prevent possible health issues to landscape workers and the public. It is also possible to utilise the Permavoid system to irrigate landscaped areas within the building plot, both at the grade level and at podium and roof levels. The recovery of rainwater and condensate can be utilised in conjunction with or in lieu of TSE.

With the introduction of the new National Water Act combined with a public education programme promoting the need to conserve water, it is believed that water consumption per capita will reduce. This will reduce the amount of wastewater available for treatment and reuse and consequently there will be less TSE volume available for effective irrigation of Public Realm areas and Public Open Spaces. Therefore, further development is required to develop and maintain these areas with minimal reliance on potable water supplies, wastage, and energy.

6.3 RENEWABLE ENERGY STRATEGIES

In this study, 89 percent (50 of the 56) of the interviewees noted that their organisation currently implemented renewable energy strategies. It is an indisputable fact that energy has become indispensable (essential) to human life, along with air, water, food and shelter. In addition to the importance of energy is its demand, due to the growth and future growth of the world population.

The world population, as of 2019, of 7.7 billion is projected to increase to 8.5 billion by 2030 and 9.7 billion in 2050 and to 10.9 billion in 2100 (UN DESA, 2019). The population of sub-Saharan Africa is projected to double by 2050 (99 percent). Other regions will see varying rates of increase between 2019 and 2050: Oceania excluding Australia/New Zealand (56 percent), Northern Africa and Western Asia (46 percent), Australia/New Zealand (28 percent), Central and Southern Asia (25 percent), Latin America and the Caribbean (18 percent), Eastern and South-Eastern Asia (3 percent), and Europe and Northern America (2 percent). Also, 90 percent of this increase will be in developing countries alone (World Bank, 2015). Understanding the population growth, the changes, challenges and opportunities that this increase will produce are the keys to designing, implementing and achieving sustainable development in the world (UN DESA, 2015).

Between 1850 and 2010, the cumulative global emissions of developing countries were lower than those of developed countries, at 48 percent and 52 percent respectively (UN DESA, 2015). However, as Beltramello et al. (2013) explained (taking the growth in population into account and projecting the possible emissions for the next 35 years and adding all greenhouse gas (GHG) emissions) the prediction is that emissions of developing countries will surpass those of the developed countries. By 2020, these

countries could be responsible for approximately 51 percent of emissions with an exponential increase the following years. Hence, somewhere during the current decade, sustainability issues in these countries must be addressed to avoid a larger climate change development.

Billions of new consumers with needs for housing, food, water, clothing, transport but most importantly energy, will be created by population growth. However, the future projection of the world situation shows that this current growth could not be sustained, due to the reduction in the availability of natural resources, the environmental deteriorating, climate change and economic difficulties of developing countries (Asif and Muneer, 2007; Gross, 2015).

The scenarios that the Energy Council (2013) developed (for the “Business as Usual” projection for 2013-2050) show that world energy demand will be about 80 percent higher. Fossil fuels will still account for 85 percent of the energy mix, and GHG emissions are estimated to rise by 50 percent, primarily powered by energy use that would create a 70 percent growth in CO₂ emissions. Also, Ajayi (2011) and Beltramello *et al.* (2013) both suggested that water demand is projected to increase by 55 percent, with the demands of the electricity sector responsible for a significant amount of the projected surge for 2050 compared to 2013 levels.

As Noailly and Smeets (2013) emphasised, business models are rarely created with environmental sustainability values at their core, even though the business community has been increasingly recognising the challenges posed by diminishing natural resources and climate change. However, these challenges are usually included in marketing strategies but are not always incorporated into the foundation of a company’s business

plan (strategy and operations). Generating value is the core reason for this as every business plan is centred around profit gain. Also, according to the Commission for Environmental Cooperation (2003), many companies believe that environmental sustainability is more of a challenge that generates unnecessary cost, instead of a key source of value creation both for the business and the customer, which is at the heart of any business model.

The need to alter the traditional economic models and approaches that government and businesses have been using has been exposed by the current economic crisis and by several researchers, Gross (2015) and Noailly and Smeets (2015) to name a few. Governments around the world are gradually pursuing more innovative ways to increase their economic activity, and at the same time find solutions to global environmental challenges, such as the shortage of natural resources, and climate change.

As already stated, developing countries will be responsible for the majority of the increase in population and GHG emission, making them the greatest potential climate change contributors; it is only logical that the focus of the latest investigation is on preventing these scenarios from happening.

6.4 SUSTAINABLE SPORTS STRATEGIES

The landscape of sport administrations has transformed radically over the past decades. The tendency is for sport structures to progressively deploy further and expand on current environmental strategies. This attention on the environment will remain to be on the programme of numerous sport organisations not only as a result of change in social beliefs, but similarly because of new opportunities from several of stakeholders, (Trendaflova *et al.*, 2014; Kellison, 2015).

In this study, 86 percent (48 of the 56) of the interviewees noted that their organisation currently implements sustainable sports strategies. Some of the sustainable sports strategies adopted for the Doha 2022 FIFA World Cup, as cited by the interviewees, include:

- Green spaces: More than 850,000m² of new green spaces will be created in the stadium precincts, while more than 5,000 trees will be planted. The stadiums will become green lungs and community hubs for their local residents.
- First demountable FIFA World Cup stadium: Ras Abu Aboud Stadium, which will be built from shipping containers, will be completely dismantled following the tournament. This approach reduces the waste generated during production of stadium components and the waste created on site during construction.
- Energy efficient LED sports lights: The stadiums will be using energy efficient LED lights, which will provide better quality illumination than conventional lights while using only a third of the electricity.
- 170,000 seats will be donated: After the tournament, the modular upper tiers of some stadiums will be donated to countries in need of sporting infrastructure. This forms an integral part of Qatar's legacy planning and will ensure the stadiums are fit for purpose after 2022.
- Stadiums are designed to consume 40 percent less energy during operation: The stadiums have many energy efficiency features, including insulation, efficient cooling and ventilation systems, providing a notable increase in energy efficiency when compared with other stadiums.
- Re-using or recycling 90 percent of materials from the old Al Rayyan Stadium: Many of the materials from the deconstructed Ahmed Bin Ali Stadium – that previously occupied the site – will be used throughout the stadium complex,

with some becoming public art installations. Trees that once surrounded the old venue have been kept in place in order to minimise changes to the natural environment.

- Public transport connecting stadiums: Public transport will make it very easy to get to the stadiums. Once complete, Doha Metro will provide a fast, cost-effective and environmentally friendly way for everyone to reach matches, fan zones and accommodation during the 2022 FIFA World Cup.
- Cultural heritage: With a particular focus on water and energy efficiency, and a commitment to maintaining architectural and cultural heritage, venues such as Al Thumama Stadium and Al Bayt Stadium – Al Khor City will represent Qatar's rich history, while embracing the most state-of-the-art practices to ensure they will be arenas of the future in every way.
- Water conservation: By capturing condensate water from cooling systems and using it in irrigation, using treated sewage effluent water for dust suppression and using 40 percent less water than conventional stadiums, the venues for 2022 have water conservation as a top priority.
- Global Sustainability Assessment System (GSAS) certification: All sites are on track to achieve 4-star GSAS certification. The soon-to-be-completed Al Wakrah Stadium and Al Bayt Stadium – Al Khor City have both exceeded the minimum requirement by being awarded class A* (5-star) GSAS rating for construction management.

Previous studies indicated that sport administrations are effectually tracking the negative environmental influence of their operations generating results counting growing administrative legality, deterring permissible recourse, saving money, and creating robust relations with key shareholders (McCullough *et al.*, 2015; Trendaflova *et al.*, 2014;

Trendafilova, and Babiak, 2013; Trendaflova *et al.*, 2013; Mallen *et al.*, 2011). Results also showed there are barriers related to the effective adoption of environmental strategies; for instance, communicating matters and accessible managerial resources.

At the same time, research also revealed that sports administrations should establish relations and develop long-standing corporations with business professionals, mainly in the sector of solid waste management and the establishment of energy and water-efficient initiatives (Trendaflova *et al.*, 2014; Trendafilova, and Babiak, 2013; Trendaflova *et al.*, 2013; Mallen *et al.*, 2011).

Stinnett (2013) indicated that these measures can benefit by reducing operating and running expenses, improving air quality, reducing waste products, and saving resources. Regions can comprise to adopt sustainable actions; green cleaning, reheating/air circulation/air-conditioning maintenance, energy saving, water upkeep, green travel, recycling programs, food service procedures, and green grounds protection (Stinnett, 2013). The advanced obligation of sports leaders and collaborative work with the NRDC and the Green Sports Alliance has been stated in the 'Game Changer' report, published in 2012. The report offered various case studies of expert sports businesses in North America and their most successful and effective greening strategies (Trendaflova *et al.*, 2014).

6.5 RESOURCES EFFICIENCY STRATEGIES

Of the interviewees, 80 percent (45 of the 56) noted that their organisations had implemented resources efficiency initiatives. The most frequently cited initiatives under the umbrella of resources efficiency initiatives include: water saving initiatives, energy saving initiatives, removing process inefficiencies, improving service quality, reducing

energy intensity of the services, enhancing material recyclability, upgrading existing technology with new technology (e.g. replacing old cars with new energy efficient cars), and re-using materials (e.g. paper recycling, double side printing), and maximising the sustainable use of renewable resources.

Energy saving received notable amount of emphasis, as energy saving is a means of reducing costs. For instance, LED technology and automation of lighting systems resulted in energy savings. The most frequently cited initiatives under the umbrella of energy savings include: “promoting energy reduction”; “records kept with documented reduction in energy usage”; “performance monitoring carried out regularly”; “energy saving products in use”; “installing meters and switching to low energy light bulbs, adopting options for energy efficient heating systems”. “preventative maintenance arrangements to sustain the energy reduction”; and “enhanced control of electricity and gas use”.

Waste management was also emphasised by a number of interviewees, however, to a lesser degree compared to energy savings. Waste management is also used as a cost reductive measure highlighted within the drivers, but it is also an initiative organisation are looking to implement. Waste management comes from the principles of operational effectiveness closely tied to competitive advantage, where the treatment of waste is geared towards attaining the maximum value before disposal. Tam (2008) highlighted the benefit of recycling waste where it reduces demand for new resources, cutting down transport and energy costs and utilising waste which would otherwise be sent to a landfill. In this study, the most frequently cited initiatives under the umbrella of waste management include: “our department is improving its waste management profile”, “80% of the department’s total waste is being recycled currently and working to achieve zero waste to landfill”; “emphasis on reusing existing resources when possible”; “online and

totally paperless operation”; “Re-Use policy in place”; “visible recycling schemes”; and arrange for visibly labelled recycling bins in public areas”.

6.6 ELECTRIC VEHICLES (EVS) STRATEGIES

In this study, 75 percent (42 of the 56) of the interviewees noted that their organisation currently implemented electrical vehicles. Electric Vehicles (EVs) have the capacity and potential to shift world mobility habits and reduce the drastic transport-related emissions. EVs represent a fundamental change for both the energy and transport sectors. By coupling both sectors, the elimination of carbon dioxide emissions could be achieved. In spite of the rapid increase in the EVs market, the concept of this smart technology needs to be more accepted among adopters by improving market attractiveness. The Qatari auto industry, energy systems, and transport infrastructures are three important sectors that operate in isolation from each other.

Banister (2008) noted that oil industry and the in the transportation sector, the high consumption of fossil fuels and their drastic environmental impact has promoted Electric Vehicles (EVs) as an alternative to Internal Combustion Engine Vehicles (ICEV) (Martinez-Lao et al, 2017). According to Chan (2013), the first EVs were invented by the Scottish entrepreneur Robert Anderson between 1832 and 1839. The traditional individual vehicles based on combustion engines (gasoline) or powered by steam were created in 1867; however, they had less popularity compared with EVs. Furthermore, EVs gained a great reputation because of the gear change and the absence of noise (Geels, 2005).

The high price of gasoline that was adapted to the upper classes and the bourgeoisie at that time besides its difficulty of finding has made EVs popular (Mom, 2004). Therefore,

the number of EV users surpassed gasoline vehicle users towards the end of the 19th century.

Banister (2008) stated that both the oil industry and the interests in favour of fuel have put an end to EVs for a period of time. This, by creating an unfavourable environment for EVs because of their high cost of production and maintenance, low top speed and short battery life. However, with climate change, the sharp decrease of global resources, such as oil and natural gas, and the increase of awareness about sustainability amongst the population, EVs have started to re-emerge (Eberle and Helmolt, 2010). Great attention is given to EVs from academics, policymakers and private investors because of the potential this technology has to replace fossil-fuel cars and solve many problems produced by the global transport sector, including the environmental pollution caused by the excessive emission of CO₂ (Barkenbus, 2009). Amjad and Neeelakrishan (2009) indicated that 49 percent of oil production is consumed by transportation. The authors added that the transport sector is set to be on the unsustainable course due to the volatility of the oil prices and its impact on the environment.

EVs are promising to shift the world to sustainable energy and specifically renewable power generation. The generation of renewable power has a reduced steady cost that makes electricity an eye-catching low-cost energy source. Bohnsack *et al.* (2014) explained that EVs are considered sustainable technology but not sustainable per se. EVs have the potential to reduce environmental degradation and improve energy efficiency only if the electricity source used to power the vehicle is sustainable; for instance, renewable energy, bio-energy or nuclear energy.

6.7 INDUSTRY 4.0 STRATEGIES

In this study, 82 percent (45 of the 56) of the interviewees noted that their organisations are currently planning/implemented industry 4.0 strategies. Industry 4.0 refers to the fourth industrial revolution – an incoming era of cyber-physical systems powered by artificial intelligence (AI), the Internet of Things (IoT), autonomous machines, and big data. It is the next evolutionary step up from our current “digital” revolution into a new age of connected technologies and data-driven insights.

Internet of Things, otherwise known as IoT, is a recent example of a paradigm, which is gaining momentum to becoming the widest method of wireless telecommunications across the world. IoT is understood to have a huge impact on several everyday life situations and will influence those in working and domestic fields.

Al-Fuqaha *et al.* (2015) shows Internet of Things (IoT) is being used widely in various sectors for the integration of data collection in order to serve a wider purpose, in which there are an infinite number of uses. Silverio-Fernández *et al.* (2018) noted that the expected growth for the number of devices to be connected to the internet will be around 25-50 billion by 2020. Currently, IoT is being implemented and used across the world and embodies a major step to integrate stakeholders via autonomous information exchange. The concept of IoT is to enable data to be collectively filtered and analysed to be used for more diverse use.

Edge, Multi-access edge computing (MEC) is a network architecture concept still in mention among engineers at IBM. The MEC will offer cloud computing capabilities with an IT service environment at the edge of the network in order to deliver faster speeds. The basic theory is there are running applications which are performing related

processing tasks closer to the cellular customer, essentially reducing network latency and congestion resulting in apps performing better. With 5G recently appearing, the same paradigm can be adopted for cloud computing when it comes to connected devices. A good way to resemble what this means is with smart devices such as mobile phones, connected cars, and drones would first be reaching the Edge Cloud which is at the edge of the network; this would mitigate the latency issue and could also offer more security.

5G, also known as the 5th Generation of cellular mobile communications, is slowly being rolled out and deployed across the world. In the UK, only a selection of handsets are able to support 5G data communication combined with only a strict number of telecommunication companies offering 5G data plans. 5G promises a higher rate at which data can be transferred from server to device, reduced latency, energy saving, cost reduction, more system capacity and an increase on device connectivity. However, with these benefits in mind, the current cloud computing challenges currently being experienced with cellular mobile communications still exist; mainly with network latency, ability to meet real time requirements of large-scale sensor networks, and insufficient bandwidth for all mobile devices, as well as security concerns. In order to be able to analyse data from an array of sensors and the unique amount of data collected by IoT devices, a substantial amount of computer power and capability is required.

6.8 HEALTHCARE STRATEGIES

Of the interviewees, 64 percent (36 of the 56) noted that they had implemented various healthcare strategies. The leadership of Qatar has long understood that a healthy nation is a productive nation. The Human Development pillar of the Qatar National Vision (QNV) 2030 emphasises how an effective healthcare system is critical to Qatar's success because it directly impacts social productivity and economic competitiveness. With the support of

the Ministry of Public Health, Qatar became the first country in the world in December last year to utilise a Clinical Information System across its entire public health sector, connecting the entire system through shared patient information. The healthcare sector is facing numerous challenges, pressures and calls to improve efficiency as demand for services is on the rise. This rise in hospital activities is mainly due to the change in demographics and that more people are living with complex long-term health conditions (King's Fund, 2019b). An aging population is positively related to chronic illnesses requiring increased usage of healthcare resources (Kruse et al., 2018). This means demand on services is on the rise as more people are living longer with complex healthcare needs.

Another contributing factor to the rise in demand of healthcare services is the fact that more people are living with multiple long-term health conditions, such as diabetes, cardiovascular, and respiratory diseases (King's Fund, 2019). In Qatar, hospitals have become overwhelmed with this demand resulting in over-reliance on private services which are very costly. Additionally, new emerging medical technologies that enable more people to be treated within a short period of time are becoming available.

Healthcare providers are facing a shortage of clinicians, such as doctors and nurses, and it is an enormous challenge for healthcare organisations to recruit and retain clinicians. A shortage of trained clinicians impedes appropriate delivery of care and treatment to patients (Poudel and Nissen, 2016). These major challenges have driven Qatari healthcare organisations to rethink the way services are delivered in order to respond to this rise in demand and still continue to deliver safe and high-quality care with positive outcomes to patients.

With digital technology speedily transforming people's lives, smart healthcare strategies have emerged as a potential solution to overcome these challenges. Treisman *et al.* (2016) defined smart healthcare as a collection of mobile devices, web-based applications and digital technologies that improve the delivery of healthcare.

Digital patient records and tele-medicine are helping evolve Qatar's healthcare market, through cost-time optimisation and improved patient care. As Qatar's healthcare providers rapidly adopt a wide range of connected solutions, the country's healthcare market is set to grow by 50 percent, from \$6bn in 2016 to \$9bn by 2020, according to a report by investment bank Alpen Capital. Supporting Qatar's national goals of delivering a world-class healthcare system, in line with the National Health Strategy 2017-2022, and Qatar National Vision 2030, there is a strong demand for the latest connected healthcare solutions that run on cloud technology. Bringing together medical professionals, insurance providers, and patients on one real-time cloud platform is optimising costs and delivering better patient care across Qatar. Qatar's medical providers are already benefitting from healthcare solutions such as the CloudClinik, a cloud-based electronic medical record and practice management system. It allows for digital patient records, staff scheduling, patient booking, and prescriptions. Scalable cloud solutions will support the next generation of Qatar's healthcare innovations.

6.9 SUSTAINABLE WORKFORCE DEVELOPMENT STRATEGIES

Of the interviewees, 57percent (31 of the 56) noted that their organisations had implemented sustainable workforce development strategies. Qatar is committed to advancing the well-being of its population and has made tremendous progress in improving human development – moving from 57th in 1997, to 33rd rank globally and first in the Arab world in 2016 according to UNDP's Human Development Index.

Maintaining progress necessitates continued social sector investments, particularly in young people. Overall success in achieving social well-being cannot be measured only through the use of traditional measures. The foundation of any sustainable economic system is employment, and therefore a functional green economy will need to ensure that it provides jobs that are both decent and meaningful (Huberman, 2010). The projected increase in the global human population highlights the ongoing need to create new employment opportunities. Major shifts in employment and the workforce are occurring throughout the world, partly in response to the continual emergence of new technologies. Such shifts occur (1) across sectors (or industries); (2) across enterprises within the same or similar sector (industry); and (3) within enterprises (UNEP, 2012c). The speed and the degree of job creation and loss across these three levels determine the overall effects on the number of jobs, as well as income.

A key question is what the impact of developing the green economy will be on the number, type and quality of jobs. According to UNEP (2012c), employment will be affected in at least four ways. In some cases, additional jobs will be created, such as in the manufacturing of newly developed green technology. Some employment will be substituted, for example, resulting from the shift from fossil fuels to renewables, or from waste disposal to recycling. Some jobs may be eliminated without being replaced, for example, when some polluting technology or industrial process is phased out. Many existing jobs may be transformed and redefined, as skill sets, work methods and profiles become greener. For example, many construction workers and electricians may need retraining in order to retro-fit or construct green buildings. The net effect of the green economy on employment will depend on the relative importance of these four elements. There is widespread hope that in many countries, green policies and investment will stimulate new economic growth and lead to higher income and employment (Borel-

Saladin and Turok, 2013). Large-scale investment in new technologies, equipment, buildings and infrastructure could be a major stimulus for new employment (UNEP, 2012c). However, such positive outcomes will only be achieved if the labour market is supported by appropriate policies, such as those providing retraining in relevant skills, including entrepreneurship and apprenticeships for green jobs. Further, there may be a need to facilitate the reallocation of workers from contracting to expanding sectors of the economy, such as renewable energy (Borel-Saladin and Turok, 2013). Many estimates of green job growth give little recognition to the significant societal problems that can arise from job losses in industries that go out of favour, such as heavy manufacturing and coal mining (Morriss *et al.*, 2009). Also, there is concern that the development of a green economy will not automatically lead to more decent or rewarding work, highlighting the need for policymakers to take into account people's livelihoods and working conditions.

6.10 SMART VILLAGE STRATEGIES

Of the interviewees, 48 percent (27 of the 56) noted that they had implemented various smart village strategies. With urbanisation on the rise, with people migrating to cities and away from countryside and other peripheries for better livelihood, there is an eminent and urgent need for strategies to improve lives and livelihood in rural communities to reduce this negative urbanisation trend which has been continuing and expected to reach 96 percent by 2030 (Holmes, 2017). This method of urbanisation is described as detrimental and it should therefore not be the only option for a better life, since half the world's population live away from cities, further emphasising the need for an alternative, the Smart Villages initiative (Garai *et al.*, 2015).

It is apparent that land development in the second half of the 20th century generally contributed to increasing inequality and led to growing competition between territories,

which resulted for the need to resort to strategies that emphasise balance, social cohesion and competition simultaneously (Tang *et al.*, 2017). The global call to an immediate and sustainable action for bettering rural life is seen when the world met in New York in 2015 and adopted the Sustainable Development Goals (SDGs), which set the benchmarks for defining the global development action for the next 15 years (Holmes *et al.*, 2015). Active efforts can be seen on a local scale, close to home, although the initiative of Smart Villages is still a relatively new concept when it comes to GCC countries.

A Smart Village does not have a categorical definition as each community determines what a 'smart' village is according to their needs, priorities and life dynamics. However, these different Smart Villages have in common are the fundamental driving factors that are the building blocks for the 'smartness' of a village, which is emphasised in the 'Smart Villages Pocket Guide'. The evolving concept of Smart Villages signifies to rural territories and communities which shape their existing strengths and resources, as well as developing new initiatives (Visvizi and Lytras, 2018).

Smart Villages can be described as places where conventional and new networks/services are heightened by utilising of digital, innovations, telecommunication technologies with the better use of knowledge to benefit the locals and businesses (Ringenson *et al.*, 2018). Subsequently, introduction of digital technologies and encouraging innovations may help quality of life with higher standards of living, "public services for citizens, better use of resources, less impact on the environment, and new opportunities for rural value chains in terms of products and improved processes". This means that Smart villages are not the only method for the sustainable development of rural territories, but they are certainly an approach that can improve the quality of life and give young people positive reasons to stay rather than migrate from rural areas (Holmes, Jones and Heap, 2015).

The initiative of smart villages offers an answer to the search for ways of applying the concept of sustainable development for rural areas. The initiative is in the first phase of its preparation and implementation. It is envisioned to reinforce the territorial capital of the countryside, at the same time having social and technological innovations as a tool for its application. Some of the barriers to applying this initiative include: reluctant openness of the rural community to adapt, low innovation capacity and low level of social capital, low capacity of the local markets, spatial distance, and poorly developed transport and communication network.

The main assumption of the smart villages' initiative is that the technological progress, if successfully combined and integrated with other off-urban development initiatives, can provide new opportunities to rise incomes, provide services and reinforce society, which subsequently and significantly better the quality of rural life. In the smart villages' initiative, technology is as vital as capitalising on infrastructure, entrepreneurial development, social capital and other society needs. It is also important to have good management and involve the citizens. The smart villages concept pays attention to the abilities of using e-skills, that can be providing access to health e-services or other basic services. However, in comparison to urban areas, rural communities demonstrate lower level or sometimes none with regards to accessibility and openness towards using new innovative information technologies. Hence, it is essential to increase the innovative development of rural territories with major participation of social innovations. This can then become the generator of positive changes following on in the generation and development of human or social capital that can contribute to the more effective and sustainable implementation of technological innovations in urban areas (Guzal-Dec, 2018).

The whole essence of developing smart villages is to provide remote communities with sustainable energy; modern information and communication technologies; good education and healthcare; access to clean water, sanitation, and nutrition; and the growth of social and industrial enterprises to boost incomes.

6.11 SUSTAINABLE MOBILE APPS

In this study, 45 percent (25 of the 56) of interviewees noted that their organisations are using mobile applications to manage sustainability issues. Part of the development the Information Technology (IT) industry has experienced in the last decade is the integration between platforms, which allows for faster exchange of data (Leung *et al*, 2013). Mobile technology has found an ally in cloud computing for the management of large flows of data; that way the mobile applications process the information, and this is ultimately stored in the cloud. Although this is a very popular topic in recent investigations, research on mobile technology and cloud computing for the public sector has mainly focused on the applications it has for project management. The SAP software offers a suite for the environment, health, and safety. It not only focuses on having a positive impact on the environment, but it also accomplishes the reduction of cost along the way, improvement of operating margins, increase of a brand's reputation, and attracting new investors. On the other hand, the SAP Sustainability Information Center offers other key benefits, such as the increment of operational efficiency, by undertaking an operational risk management system, the reduction of cost related to energy consumption, the efficient management of product regulations that guarantees its compliance and safety needs, and the generation of timely, valuable, and reliable reports for both regulatory and voluntary organisations.

6.12 SUMMARY

Sustainability is about building a society in which a proper balance is created between economic, social and environmental objectives. In commitment to the QNV 2030 and the Sustainable Development Agenda 2030 adopted by world leaders at the World Summit on Sustainable Development in September 2015, the State of Qatar has aligned the outcomes and goals of the Second National Development Strategy (NDS-2) 2018-2022 with the goals of the Sustainable Development Agenda. With this alignment, the goals and targets of the Global Sustainable Development Agenda 2030 have been adapted and integrated into NDS-2. Public sector agencies are allocating their resources to achieve the NDS goals in accordance with the agreed timeframe.

This chapter discussed ten key sustainable strategies that have been implemented in Qatari public sector organisations. In the order of implementation, they are: sustainable water management strategies, renewable energy strategies, sustainable sports strategies, resources efficiency strategies, electric vehicles (EVs) strategies, Industry 4.0 strategies, healthcare strategies, sustainable workforce development strategies, smart village strategies, and sustainable mobile apps.

For instance, Qatari public sector organisations ensure the provision of water for all the country's population. The percentage of population that benefited from safe drinking water services reached 100 percent, where seawater desalination constitutes 60 percent of total available water. Sustainably managed sanitation services are also provided for all and the percentage of safely treated wastewater reached 100 percent as well. The total loss of desalinated water was reduced to 10 percent in 2016 (of which 4.7 percent was due to real loss and less than 6 percent was due to administrative loss), compared to 30 percent in 2011. The Rationalization Law No. 26 of 2008 was amended by Law No.

20/2015 to raise users' awareness on the optimal use of water. In addition, defective meters have been replaced with smart meters. Modern techniques to rationalize the use of water have been installed in some schools and mosques and are being installed for other uses. Wastewater treatment plants have been expanded and the study of the establishment of an industrial wastewater treatment plant has been completed. Qatar's water policy has also been prepared and approved, which included an integrated management of water resources to be implemented in 2018, while the Qatar Water Strategy is underway and will be completed shortly.

Similarly, public sector organisations have ensured that Qatar's population has access to affordable, reliable and sustainable energy services by following an optimal pricing method of energy sector-related goods (water, electricity, fuel). Qatar has adopted alternative sources of energy, such as: the establishment of Umm AlHoul projects, Siraj Energy Company and a number of solar-related industrial companies, e.g. Qatar Solar Technologies. Qatar has also promoted energy and gas efficiency through the formation of a National Renewable Energy Committee at the Ministry of Energy and Industry, which is drafting a national policy for the development of the new and renewable energy sector. Within the framework of enhancing the efficiency of energy production, distribution and consumption, Qatar's public sector organisations have undertaken the following measures: Qatari District Cooling Company "Qatar Cool" has achieved compliance with the transition plan for the use of treated wastewater in the operation of cooling stations instead of using potable water (in the Pearl and West Bay stations). The implementation of the programme of rationalising energy and water consumption (Tarsheed) continues, leading to a reduced rate of electricity per capita consumption by 18 percent and water per capita consumption by about 20 percent from its launch in 2012 until the end of 2016. The necessary actions were taken by Qatar Electricity and Water

Company (KAHRAMAA) for the rehabilitation and development of the Ras Abu Fantas area by replacing old plants by new ones with better efficiency, state-of-the-art technologies, and low emissions by 2018.

Overall, the following inferences and implications were drawn:

- The outlook for improved sustainable strategies efforts from public sector organisations of the state of Qatar looks quite promising at present. This is because organisations that implement sustainable strategies will benefit from improved reputation, better employee engagement, lower operating costs, and better relationship with key stakeholders. Clear and strong branding should improve the public perception of the quality of services that the public sector offers, and this in turn, will increase trust, loyalty and will help reduce the perceived risk.
- According to QNV 2030, improving the health of Qatar's population through an integrated healthcare system, managed according to world-class standards, designed to meet the needs of existing and future generations. The current study results suggest that, to meet the goals of the QNV2030, the implementation of healthcare strategies is still evolving in the State of Qatar. Changes in demographics, shortage of clinicians and more people living with multiple healthcare conditions have greatly increased demand on healthcare services. Also, with increasing calls to improve quality and safety of care whilst reducing cost, healthcare providers have turned to smart healthcare strategies as a potential solution to these challenges and demands. However, Qatar has not invested in building capacity growth in the healthcare management. It is therefore recommended that future studies investigate and analyse key challenges that healthcare providers face when adopting smart healthcare management strategies.

Therefore, there is a need to re-examine the National Health Strategy to Qatar's health challenges, aligned to a global shift in thinking towards population health and more smart and integrated care.

- With growing global interest in sports development to accelerate the transition to sustainable development and societal well-being, an increasing number of Qatar sports organisations are obliging themselves to adopt such a move, hence, sports bodies have started to make sustainability a great corporate agenda priority, bearing in mind that embedding sustainable strategies in the sport sector would encourage public commitment to protect the environment and society. However, the Qatari sports sector is still in the developing stage. Therefore, Qatari sports organisations should be ahead of many different industries due to the features they have at their disposal and the ability to generate social awareness worldwide. The Qatari sports sector must take leadership in sustainability strategies.
- Industry 4.0 has enormous potential to enable Qatari public and private sector organisations systems and processes to be automated. Rough estimates say the Industry 4.0 market could exceed US\$ trillions in just a few years' time. However, this will require Qatari manufacturers to make bold investments in the equipment, integrated systems, training, and organisational capabilities needed to truly embrace the Industry 4.0 revolution. Some of the recommended steps to consider in implementing Industry 4.0 include:
 - (1) Learn what Industry 4.0 really means: do the work to separate hype from reality. Reach out to industry experts, learn what others in your space are doing, and begin building a network of partners who can offer their own insights and expertise into Industry 4.0 implementation.
 - (2) Develop an Industry 4.0 implementation plan: organisations cannot throw money at Industry 4.0 and expect work to be done. Unlocking the benefits of

Industry 4.0 means taking stock of organisation capabilities, understanding organisation specific goals, and drafting a smart strategic roadmap. Be honest about what can be done now and how to be best positioned for the future.

(3) Identify the benefits: the value of Industry 4.0 will differ for each organisation depending on their products, their customers, and desired outcomes. For instance, for partners in the defence supply chain, this could mean exploring how Industry 4.0 tech (including cloud computing, big data, 3D printing, AI, virtual reality) which can advance defence operations and how organisations can lead the charge.

(4) Assess the risks: investing in Industry 4.0 can help organisations disrupt the industry and overtake competition. However, as it is disruptive, it can also cause operational disturbances, stakeholder backlash, and delays. Measure the potential risks of each Industry 4.0 technology and plan from there.

(5) Design a pilot project: implement Industry 4.0 fundamentals in smaller, containable trials. Remember, however, that pilots and discrete projects will not necessarily deliver sustainable performance improvement until greater scale is achieved.

(6) Evaluate projects: measure the performance results from Industry 4.0 initiatives and use that data to change course or achieve even better outcomes.

(7) Set up a wider Industry 4.0 implementation framework: pursue Industry 4.0 on a larger scale through more strategic planning. Think holistically instead of functionally and assess an organisation's current Industry 4.0 maturity through multiple lenses. These steps can better prepare organisations for the inevitable changes that are coming.

- Climate change will impact Qatar by enhancing ecological and physical vulnerabilities, as well as economic vulnerabilities. According to Qatar's 2011 National Communication to the United Nations Framework Convention on

Climate Change (UNFCCC), climate change presents a dual threat: “On one hand, like other developing countries with minimal adaptive capacity, Qatar’s ecological and human systems are prone to the adverse impacts of climate change. On the other hand, due to its total dependence on the export of carbon-based resources, Qatar’s economic welfare and prosperity depends on the outcome of the climate change negotiations which seeks, as an ultimate objective, complete phase out of fossil fuel energy sources from the world energy market.” As the most important sector of the economy, the energy sector will be adversely affected by temperature increases and sea level rise. The majority of oil, gas, power and water facilities are located either offshore or along the coast. Increases in air and sea water temperature will influence the design values for power and desalination facilities. Qatar is taking a range of actions to reduce its greenhouse gas emissions and to position itself as a leader in the development of climate change and clean energy technologies. However, carbon emissions reduction strategies are in their infancy. There seems to be a significant knowledge gap relating to combating carbon emissions. Therefore, sharing best practices related to carbon emissions reduction practices from other countries and academic research institutes is essential.

- Domestically, Qatar has a renewable energy goal of sourcing 20 percent of the country’s total energy from renewable sources by 2024. The mitigation measures described in the National Communication are also outlined in Qatar National Vision 2030 and include the following initiatives: Qatar Petroleum’s corporate objective of achieving zero gas flaring; the state of Qatar’s membership in the World Bank greenhouse gas reduction programme through its Global Gas Flaring Reduction Partnership; the establishment of formal institutions to manage climate change issues; the development of public transport systems, including the

investigation of electric taxis and compressed natural gas buses, and plans for a mass transport network; and the initiation of a national team on “environmental policies for renewable energy.” Qatar also has a national plan for energy efficiency, optimization and resource utilization (QPEERU), which will serve as a driver for the GHG mitigation initiatives. For instance, without new business models, citizens will struggle to accept the e-mobility transition. EVs technology is the main key in the transport sector in improving air quality and reducing greenhouse gas emissions. New business models must be nurtured to capture the benefits of e-mobility; however, the business models that will be investigated to work on the innovation interface represent only some possible future models.

- Major shifts in employment and the workforce are occurring in Qatar, partly in response to the continual emergence of new technologies. Some employment will be substituted, for example, resulting from the shift from fossil fuels to renewables, or from waste disposal to recycling. There is widespread hope that in Qatar, green policies will develop and that will stimulate new economic growth and lead to higher income and employment. However, such positive outcomes will only be achieved if the labour market is supported by appropriate policies, such as those providing retraining in relevant skills, including entrepreneurship and apprenticeships for green jobs.
- The initiative of smart villages offers an answer to the search for ways of applying the concept of sustainable development for rural areas. In Qatar, this initiative is in the infancy phase of its preparation and implementation. The evolving concept of Smart Villages signifies to rural territories and communities which shape their existing strengths and resources, as well as developing new initiatives. Therefore, there is a need for implementing more smart village strategies in Qatar.

Furthermore, there is a need to develop and implement a national smart village agenda.

- The scarcity of knowledge and expertise associated with sustainable strategies is, and will continue to be, a huge challenge for Qatari public sector organisations. Therefore, training programmes related to the management of smart and sustainable related knowledge will help leaders, managers, and change agents to better understand on how to craft and implement various smart and sustainable strategies to achieve QNV 2030.
- It is concluded that smart and sustainable issues are complex, dynamic, and multifaceted. Most of the smart and sustainable goals are inherently collaborative, as they relate to supporting the community and future generations. Therefore, to solve some of Qatar's sustainability problems, it is important that key leaders and decision makers connect with other stakeholders to have a positive social impact.

Chapter 6 has addressed the second research objective, which is “to investigate and document the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030” and the second research question, which is “what are the key sustainable strategies that are currently being implemented in the Qatari public sector organisations to achieve the National Vision 2030” of this study. The next chapter (Chapter 7) discusses the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda.

CHAPTER 7 : SMART CITIES STRATEGIES ADOPTED IN THE STATE OF QATAR

7.1 INTRODUCTION

The purpose of this chapter is to present the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda. The results are based on the perceptions of the 56 interviewees. The findings are also substantiated with the relevant literature. In this study, interviewees were asked to list and describe key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda in their organisations. This study revealed seven key strategies under the umbrella of smart cities strategies that have been implemented to achieve Qatar's smart cities agenda (see Table 7.1). In the order of implementation, they are: smart energy management strategies, smart water management strategies, smart waste management strategies, smart transport strategies, smart education strategies, smart buildings strategies, and governance models for smart cities strategies. Each of these key strategies is discussed in detail from section 7.2 to 7.7. Finally, section 7.8 summarises the key findings. In doing so, Chapter 7 addresses the third research objective, which is "to explore and document the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda" and third research question, which is "what are the key smart cities strategies that have been implemented to achieve Qatar smart cities agenda?".

Table 7.1: Implementation of smart cities strategies in Qatar (N=56)

Sl. No	Smart cities strategies implemented	Percentage of interviewees cited (N= 56)
1	Smart energy management strategies	86% (48/56)
2	Smart water management strategies	82% (46/56)
3	Smart waste management strategies	75% (42/56)
4	Smart transport strategies	70% (39/56)
5	Smart education strategies	66% (37/56)
6	Smart buildings strategies	54% (30/56)
7	Governance models for smart cities strategies	48% (27/56)

7.2 SMART ENERGY MANAGEMENT STRATEGIES

In this study, 86 percent (48 of the 56) of the interviewees noted that their organisations are adapting smart energy management strategies to achieve Qatar smart cities agenda. Airaksinen *et al.* (2016) noted that international climate targets and EU 2030 targets drive cities to increase energy efficiency, use of renewable energy, and reduce environmental impacts. Hence, the focus is to develop real-time energy demand management and optimisation techniques with the capability to predict the energy demand, available local energy supply and storage capacities, based on real time data, and predictions of future energy profiles and (Zhou *et al.*, 2016).

There are also compelling national motives to reduce energy use and to adopt renewable sources. First, the Qatari government recognises the environmental impacts of high energy use. Natural gas is a relatively clean fuel, but carbon emissions have climbed

sharply and local air quality is declining (asthma is a serious ailment among Qatari children). The output from desalination plants is brine and even saltier than the Persian Gulf surrounding Qatar. Water circulates poorly in the Gulf and increasing salinities have been observed around Qatar (and other Gulf States). Desalination will require even more energy as salinity rates rise and will, eventually, be technically constrained (Elimelech and Phillip, 2011). Deloitte (2015) argued that a proportion of conventional fossil fuel plants will be displaced by distributed generation based on renewable energy sources, such as solar panels or windmills. Electricity will also be generated by a large number of nodes, of which many have a relatively small capacity. Deloitte (2015) further claimed STES as a smart solution to reduce energy consumption by recycling office buildings' excess heat during the summer, storing it underground and pump back up during winter.

Smart energy infrastructure is considered a relatively advanced sector within smart infrastructure as a whole. For instance, in the UK, the National Grid is responsible for distribution of power across national networks, along with distribution network operators (DNOs) who distribute power on more localised scales (Lee, 2012). The energy demands can vary on hourly, daily, weekly, monthly and yearly basis. This level of variance creates complex challenges for energy companies to anticipate the delivery of energy required for consumers. Smart systems in energy infrastructure make use of remote monitoring and controls and automation to facilitate improved relationships and communications between the network distributors and consumers.

Smart meters are one example of smart technologies and systems used in the Qatari energy infrastructure sector; they allow the consumer to assess their energy usage in a relatively quick and simple manner. Smart meters also allow utilities to collate data and feed it into models which are used to aid in the balance of supply (generation) and

demand. In order to improve existing smart energy systems and processes, they must become more automated and more widely distributed, rather than dependent on centralised and manual controls.

7.3 SMART WATER MANAGEMENT STRATEGIES

Deloitte (2015) stated that water is one of the most important resources in urban areas, while highlighting that the lack of water will be one of the 21st century's biggest urban challenges. In this study, 82 percent (46 of the 56) of the interviewees noted that their organisations are adapting smart water management strategies to achieve Qatar's smart cities agenda.

Deloitte (2015) suggested that smart water solutions aim to minimise waste and secure quality as one of the pillars of sustainability. Smart solutions offer leakage detection, pollution detection, advanced warning for flooding, predictive maintenance planning, and just-in-time waste collection.

7.4 SMART WASTE MANAGEMENT STRATEGIES

In this study, 75 percent (42 of the 56) of the interviewees noted that their organisations are implementing smart waste management strategies to achieve Qatar's smart cities agenda. It is estimated that currently 1.3 billion tonnes of waste are generated per year worldwide, which would increase to 3.40 billion tonnes per year by 2050 (World Bank 2019). Cities are the targets of these overhauling waste problems. Government, policymakers, and citizens are responsible for providing viable solutions for this. Cities unable to manage their waste would lack the basic facilities such as electricity, health, education or transportation (Moya, 2017). Different technologies are used around the

world to collect, segregate, transport and manage waste. The different types of waste managed in different countries are diverse.

Recognising the need for a solution to the increasing waste generation, Qatar set out ambitious targets in its National Development Strategy (NDS) 2011–2016 across all waste-generating sectors with the goal of reaching a national recycling rate of 38 percent of solid waste by 2016, as well as improving material recovery and waste reduction at the source. The stated aim was to minimise the disposal of all waste streams to landfill, this being the least-favoured waste management option on the waste hierarchy defined by United Nations Environment Programme – avoid, reduce, reuse, recycle, recover, treat, dispose – a principle adopted by many organisations and governments. To this end, the NDS calls for the elimination of waste at the source; enhanced waste management techniques; know-how and education; improved recycling infrastructure and sophisticated material recovery facilities to move Qatar towards a more integrated waste management system. However, the strategy falls short of recommending a circular economy methodology, which would close the loop on all waste streams across the country.

Deloitte (2015) argued that most cities use some type of waste management strategies to collect waste produced by households, which are normally operated on fixed routes. As a result, some waste containers are emptied when they are only half full and some are emptied days after they become full. The ‘smart solution’ is to equip waste containers with sensors that detect the volume of the waste in the container. This data can be used to enhance the number of garbage trucks and their routes, skipping containers that are not yet full, and making an early stop at containers that are close to reaching their limit. This brings about a cheaper process and elimination of full waste containers (Deloitte, 2015).

It is not unusual in Qatar to witness trash thrown out of car windows, garbage left on beaches, plastic bags floating in the wind and an army of street cleaners and volunteer beachcombers picking up after the rest of the population. With the attitude that it is the responsibility of government or others, and in the absence of fully enforced waste management policies, the desire for rapid development appears to champion all. This reality may be due in part to the need to fulfil development promises in ever-shortening timescales leading up to World Cup 2022.

Moreover, in a country where many households have hired help – cleaners, drivers, nannies – and a vast migrant worker population has different waste generation patterns and a lower stake in long-term outcomes, an added dimension is the need to educate, incentivise and empower all residents to ensure the successful implementation of waste minimisation and recycling initiatives.

The study suggests that simply designing smart waste management options may not be sufficient to achieve QNV 2030 targets, let alone anything near a zero-waste philosophy. What seems to be required is a retrofitting of mindsets and mechanisms to encourage changes in behaviours that complement the physical retrofitting of the built environment. Undoubtedly, a forward-thinking country with a desire to lead the world also needs an excellent approach to solid waste management. This may be achieved by: taking responsibility for waste; unravelling the rules and re-thinking how things are done to find innovative ways of eliminating waste, whatever its source; exploring the “impossible” and aiming for zero; we might not get there but the target is a great motivator; looking for the catalysts and their networks; celebrate their achievements and use them to energise and engage others; educating with big, brave out-of-the-box projects that spark people’s

imaginations and encourage others to join in; and investing in practical research projects to determine what works in Qatar.

7.5 SMART TRANSPORT STRATEGIES

Qatar is experiencing rapid economic and industrial growth. This growth is characterised by a rapid population increase and an urgent need for the development of both infrastructure projects and major transport projects. In order to handle this rate of development within Qatar, Public Works Authority (Ashghal) is developing a fully integrated multimodal transportation system in line with the Qatar National Vision QNV2030 and Qatar National Development Strategy QNDS2011-2016. The government has made investment in the country's transport infrastructure a top priority for the next decade. With some \$70 billion worth of projects already planned, the sector will be the largest source of project opportunities.

In this study, 70 percent (39 of the 56) of the interviewees noted that their organisations are implementing smart transport strategies to achieve Qatar's smart cities agenda. Part of the Qatar National Vision 2030 aims to support a sustainable country and move from a carbon-based to a knowledge-based economy. Many of these aims are in line with the Smart City goals and it is recognised that intelligent transport systems (ITS) will play an important role. Smart transport infrastructure enables society to function through the movement of people and goods i.e., passenger and freight transport systems (Ernst and Young, 2015). It is a fundamental economic driver in any city; thus, it plays a critical role in enabling a smart city to function as a truly smart city (Ernst and Young, 2015). Smart transport has progressed rapidly over the past twenty years; for example, land transport, shipping and aviation all had separate satellite navigation systems, whereas now they can all operate on the same satellite networks (RAEng, 2012). Smart transport systems utilise

real-time traffic information in order to adapt to traffic signals. They also use big data analytics and data mining in smart applications to improve the efficiency of traffic operations (Ernst and Young, 2015).

There are four key drivers for planned projects. These are support Qatar's National Vision 2030, facilitating events including the 2022 FIFA World Cup, a commitment to regulations of safety, health, and the environment and a strategic goal to position Doha as a trade and transportation hub between Africa, Asia and Europe. The projects currently planned, along with the resources allocated, are positioning Qatar on a path which leads the way towards Smarter Cities through the use of ITS applications. Qatar's ongoing major road projects include: Lusail Expressway Package, Orbital Highway and Truck Road, Ras Laffan to Mesaieed Expressway, Dukhan Highway, Doha Bay Crossing, Road Interchanges for the Al Khor Expressway and Doha Expressway – Qatar's first freeway. Deployments of ITS solutions are planned across all modes of transport for both urban and inter-urban networks for smarter mobility of people, goods, and services. ITS solutions will include tunnel management systems, incident detection, lane and speed control signs, weigh in motion, over height vehicle detection and weather sensors. There will also be dynamic message signs (DMS), red light and speed cameras, commercial freight management, Bluetooth systems to record vehicle journey times, tolling and automatic number plate recognition.

In summary, Qatar's cities have a great opportunity to accelerate and sustain progress in their smarter journey. As cities in Qatar continue to mature, talent becomes an increasingly valued resource, especially when combined with technological innovation. The core systems of a city are transport, government services, education, public safety, and health. These elements profoundly influence the quality of life and the attractiveness of a city. It is an exciting time for smarter cities in Qatar. Doha can soon become one of

the smart cities in the world in the information and communications technology landscape with its rapid adoption of modern trends of the digital age.

7.6 SMART EDUCATION STRATEGIES

In this study, 66 percent (37 of the 56) of the interviewees noted that their organisations are implementing smart education strategies to achieve Qatar's smart cities agenda. Deloitte (2015) argued that smart cities require smart people. Education is critical for development of talent that is motivated and enabled to drive innovation. Digital technology changes the way education is provided to students.

Smart education is a key ingredient in smart city development. Strengths in basic education, advanced training and certification, universities and community colleges, e-learning infrastructure, lifelong learning and innovation in education technologies are all part of what defines a smart city.

At this moment, thousands of Massive Open Online Courses (MOOCs), provided by world class universities, are available and the number is steadily increasing. These MOOCs can be used for blended learning: a mix of online education with on-campus education. Also, the availability of online courses, combined with the augmented supply due to unbundling of education services, allows a further personalization of education. Additionally, it allows unbundling of education by offering specific parts as an independent service rather than one curriculum at one location over a specific period of time for all students in the same form.

7.7 SMART BUILDING STRATEGIES

In this study, 70 percent (39 of the 56) of the interviewees noted that their organisations are implementing smart buildings strategies to achieve Qatar's smart cities agenda. The new futuristic smart homes in Qatar will include appliances, lighting, heating, air conditioning, TVs, computers, entertainment audio and video systems and security that are capable of communicating with each other and can be controlled from any room in the house, as well as remotely from any location in the world by phone or Internet.

Qatar's environmental record has been improving over the past several years, but it is still among the top consumers of productive land and water, states a new report from the World Wildlife Fund. With its QNV 2030 and its baby steps towards advanced infrastructure, sustainability still remains a great concern. Qatar needs to address the issue of sustainability and cost-effectiveness along with its ambition for smarter cities. Smart buildings integrate the various physical systems present in a building to function in a smart way, ensuring that all systems act collectively to optimise performance (e.g., energy performance, water usage) (Honeywell, 2015). Smart buildings require smart building management systems that can improve the efficiency of heating the building in winter, cooling in summer and provide water according to demand throughout the year (Honeywell, 2015). The smart management system also incorporates waste management for the building, helping reduce waste production e.g., replacing paper towels with hand dryers, using waste compactors, sorting waste into general food waste and recyclable waste.

7.8 GOVERNANCE MODELS FOR SMART CITIES STRATEGIES

In this study, 48 percent (27 of the 56) of the interviewees noted that their organisations are adopting new governance models to achieve Qatar's smart cities agenda. Smart cities require new governance models; therefore, smart infrastructure also requires new governance models. There must be a new approach, which balances both a top-down and bottom-up approach (United Nations, 2014). Top-down leadership/governance is clearly a need when considering the balance of using data from different smart infrastructure systems and, more specifically, in emergencies. A bottom-up governance approach can either be innovation driven by citizens or through co-creation. Balancing both approaches to governance will allow for the maximum potential to be achieved to smart infrastructure, while clearly defining ownership of risks and liabilities.

There are numerous synergies that can be exploited by balancing different governance approaches, including partnerships between: government, local authorities, universities, private sector businesses and civil society. Additionally, the creation of an efficient governance strategy and model for smart infrastructure demands a breaking down of the isolated silos that exist inside different government departments i.e., cross-communication and collaborative thinking and working is required (Kong *et al.*, 2014). Silos of information are the biggest barrier to the integration of resources for smart infrastructure; therefore, this must be addressed in new governance models. Governance models must be reformed in order to clearly define the availability and usage rights of data from smart infrastructure, with clarity on privacy rights also (Johnson and Smith, 2012).

The promotion of bottom-up participatory governance requires platforms for citizens to be able to interact with the government in a regular manner; this may be achievable using

multiple innovative and technological applications (United Nations, 2014). Governments in cities around the world are currently using a variety of innovative platforms and technologies to engage with citizens in the management of smart cities; this needs to be a focus area for smart infrastructure more specifically. An example of this is Amsterdam, where a smart citizen kit has been distributed to aid the creation of an air quality sensor network. Another example of citizen participation is in Bangalore, India. A social enterprise named NextDrop supports the coordination of information between water suppliers, centres of operation, and consumers through the use of calls and short text message services. This transfer of information and participation from consumers/citizens allows water suppliers to find out if any disruptions occur in the water network and also provides a platform for consumers and the suppliers to discuss performance related issues on a broader scale.

This provides valuable feedback to suppliers for customers' satisfaction and can help them shape their service strategies accordingly. A third example of citizen participation is in Jakarta, Indonesia, where city officials make use of Twitter to aid in the response to flooding. By sharing information on a public platform and engaging with citizens, they can share information on local and national scales, aiding in emergency response services and responses from citizens on an individual level for their own homes (Harper, 2012). These examples all demonstrate transparency and enable accountability, which only further strengthening participatory governance models (Mork and Weaver, 2009).

Smart infrastructure provides information and data that are collected via utilities and infrastructure components that are commonly controlled by different sectors within a single government. The administrative silos can be broken down by establishing a centre of operations from which several sources of data are fed. These centres of operations

enable the efficient use of data by collating various types of data, which help provide more useful information to decision makers i.e., decision support tools. This approach is a top-down approach to governance; however, it may prove to be a significant benefit to governance strategies for smart infrastructure in times of crisis.

7.9 SUMMARY

Staying at the forefront of innovation for enhancing quality of life and achieving sustainable development, Qatar is building the cities of the future. In line with its National Vision 2030, the country has embarked on a journey to develop smart cities that encompass deploying smart applications in infrastructure, buildings, energy, mobility and utilities, among other things. As urban populations continue to grow, the smart cities concept appears to be the right step towards sustainable development.

With urbanisation increasing around the world in general and particularly in Qatar, populations have shifted from rural to urban areas for an improved quality of life. Urbanisation being the new trend, the urban population is expected to rise to 5 billion by 2030. The United Nation in 2013 addressed that if urbanisation is not controlled with improved ideas, people living in slums could lack basic facilities like sanitation, electricity, and healthcare. Urban development and city population are growing at a quick pace causing diverse problems to the environment, and financial and social maintainability of cities (Bibri and Krogstie, 2017; Neirotti *et al.*, 2014). Cities are facing issues like traffic congestion, destitute urban framework, health issues, energy shortage, increasing crime rates, ageing infrastructure, and frequent power breakdown are of concern to many developed and developing countries.

This chapter discussed the seven key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda. In the order of implementation, they are: smart energy management strategies, smart water management strategies, smart waste management strategies, smart transport strategies, smart education strategies, smart buildings strategies, and governance models for smart cities strategies.

Overall, the following inferences and implications could be drawn:

- With Qatar's cities becoming increasingly globalised and competitive and moving towards knowledge-based economy, the concept of smart cities is attracting interest from city officials, the private sector, local communities, and academia. Therefore, the use of technology alone does not make Qatari cities smarter – other dimensions including cultural and natural amenities, people and skills, knowledge precincts and governance are equally important and must be addressed.
- The priorities for Qatari cities are water management, waste management, energy efficiency, environment protection, quality of life, plus collaboration for sustainable development in a city. This means that smart city concepts are aimed at the modernisation and efficiency of public transport, energy and water supply, waste management and recycling. It is suggested that, for Qatar, in order to create smart cities and to make sustainable communities, it is necessary that organisations are involved in activities that help them to establish strong relationships between the policymakers, companies, entrepreneurs, and citizens.
- It is concluded that cities are complex systems that are characterised by massive numbers of interconnected citizens, businesses, different modes of transport, energy and water systems, communication networks, services and utilities. Population growth and increased urbanisation raise a variety of technical, social, economic, and organisational problems that jeopardize the economic and

environmental sustainability of cities. The rapid growth has generated traffic congestion, pollution, and increasing social inequality. Therefore, the focus has been on the way new technology-based solutions, as well as new approaches to urban planning and living, can assure future viability and prosperity in urban areas.

- Sustainable urban planning has strong links to the planning and operating of city infrastructure, and the synergy benefits are targeted with the collaboration and coordination of these city systems. Modern digital and telecommunication technologies influence urban development. While such big data analytics offer a number of opportunities, they also raise a number of concerns and challenges. The conversion of Qatar's old municipal regions into smart cities is a topical problem, representing an actual problem for many aspects of urban infrastructure, such as building construction, renovation and reconversion, municipal public transport, and facilities.
- Digital technology can isolate and exclude sectors of society. It can threaten individual privacy and national security, displace labour, and become obsolete and expensive. Additionally, cities just starting out to develop strategies to become smarter are also met with political and financial challenges and these add additional pressure throttling the ability to make rapid headway and leading to a more cautious approach to city data.
- Budget constraints are one of the biggest issues for developing a smart city because, in urban areas, development requires a heavy amount from the budget. Hence, for the growth of smart cities, financial institutions should be used to acquire the funds for infrastructure and development work.

Chapter 7 has addressed the third research objective, which is “to explore and document the key smart cities strategies that have been implemented to achieve Qatar's smart cities

agenda” and the third research question, which is “what are the key smart cities strategies that have been implemented to achieve Qatar’s smart cities agenda?”. The next chapter (Chapter 8) discusses the key strategies that have been implemented in managing knowledge in the context of smart and sustainable strategies in Qatar.

CHAPTER 8 : MANAGING KNOWLEDGE IN THE CONTEXT OF SMART AND SUSTAINABLE STRATEGIES

8.1 INTRODUCTION

The purpose of this chapter is to discuss the key strategies that have been implemented in managing knowledge in the context of smart and sustainable strategies in Qatar. The results are based on the perceptions of 56 interviewees. The findings are also substantiated with the relevant literature. In this study, interviewees were asked to list and describe the key knowledge management strategies that have been implemented in their organisations. This study revealed eight key strategies that have been implemented in managing knowledge in the context of smart and sustainable strategies across Qatari organisations that participated in this study (see Table 8.1). They are: sharing knowledge, capturing knowledge, incentives for KM, mentoring, after-action reviews, newsletters, Internet, and WhatsApp. Each of these KM strategies is discussed in detail from section 8.2 to 8.9. Finally, section 8.10 summarises the key findings. In doing so, this chapter addresses the fourth research objective, which is “to investigate and document the key knowledge management strategies in the context of smart and sustainable strategies that are currently being implemented in Qatari organisations” and fourth research question, which is “what are the key KM strategies in the context of smart and sustainable strategies currently being implemented in Qatari public sector organisations?”.

Table 8.1: KM strategies in Qatar (N=56)

Sl. No	KM strategies in the context of smart and sustainable strategies implemented	Percentage of interviewees cited (N= 56)
1	Sharing knowledge	84% (47/56)
2	Capturing knowledge	79% (44/56)
3	Incentives for KM	75% (42/56)
4	Mentoring	71% (40/56)
5	After-action-review	68% (38/56)
6	Newsletter	61% (34/56)
7	Internet	54% (30/56)
8	WhatsApp	45% (25/56)

8.2 SHARING KNOWLEDGE

In this study, 85 percent (47 of the 56) of the interviewees noted that their organisations have implemented knowledge sharing strategies in the context of smart and sustainable strategies. This might be due to the fact that the sharing of best practices has been used for hundreds of years and their continued use emphasises the importance of sharing knowledge in the workplace. Accessing, as well as using, best work practices helps to prevent organisations from repeating errors while allowing new project teams to build on the work of their predecessors (O’ Dell and Leavitt, 2004).

The key reasons cited by these interviewees for sharing knowledge include: to share best practices, to share latest policy issues, and to accelerate and improve the flow of knowledge between key stakeholders.

Knowledge sharing is the voluntary dissemination of acquired skills and experience to the rest of the organisation (Davenport, 1997). Some define internal knowledge sharing as the beliefs or routines for disseminating knowledge and experience across the units of an organisation (Calantone, *et al.*, 2002; El Badawy, *et al.*, 2015). The acts of sharing are very important since an individual's knowledge will not have much impact on the organisation unless it is made available to other individuals (Nonaka and Takeuchi, 1995). A lack of knowledge sharing may inhibit or hinder KM efforts (Ipe, 2003). Although knowledge exists at different levels of an organisation, for instance, at individual, team, and organisation levels, sharing of knowledge at the individual level is critical to an organisation.

Knowledge sharing initiatives often form a key component of KM programmes, in terms of organisational and individual learning (Nahapiet and Ghoshal, 1998; Alavi and Leidner, 2001). For instance, the principal purpose and purposeful sharing of useful knowledge associated with carbon emissions reduction strategies will accelerate individual and organisational learning and innovation through the development of better products and/or services that are socially responsible, environmentally sustainable and economically viable.

8.3 CAPTURING KNOWLEDGE

In this study, 79 percent (44 of the 56) of the interviewees noted that their organisations have implemented knowledge sharing strategies in the context of smart and sustainable strategies. The key reasons cited by interviewees include: to improve sustainable competitive advantage, to reduce economic risks, to reduce re-work, and to reduce new hires' learning time. Jia *et al.* (2017) stated that the effort made by organisations to improve workers' performance by acquiring external knowledge can transfer internal knowledge, develop present knowledge, and eliminate outmoded knowledge.

According to Tan *et al.* (2010), knowledge capture is to identify and store knowledge and evaluate information captured; knowledge sharing is to exchange and transfer knowledge to an individual or organisation through media; knowledge re-use is to re-apply knowledge stored for innovation and updating knowledge is to archive and refine knowledge in the repository and keep necessary information up to date. Brooking (1996) noted that only 20 percent of knowledge available to an organisation is actually used and the remaining 80 percent of the employee's knowledge is wasted without effectively capturing it.

Capturing tacit knowledge is the process through which sustainability-related experience and expertise of an individual in an organisation is collected and made available to anyone who needs it (Dalkir, 2005). Without doubt capturing knowledge associated with sustainability-related strategies may be difficult, particularly in the case of tacit knowledge. Knowledge often remains tacit until someone asks an appropriate question. At that point tacit knowledge can become explicit, but unless that knowledge is captured for someone else to use it again at a later date, learning, productivity and innovation are stifled.

8.4 INCENTIVES FOR KM

In this study, 75 percent (42 of the 56) of the interviewees noted that their organisations have implemented incentives for KM in the context of smart and sustainable. According to Gope *et al.* (2017), the incentives system is based on an employee's performance level which then contributes to defining the organisational performance of the organisation. Organisations introduce monetary and non-monetary incentives for their workers that strive for success through learning, obligation, knowledge acquisition and knowledge sharing. As for non-monetary flexible incentives, organisations can offer incentives such as medical insurance, interest-free loans for house purchases, loans for weddings, and serious illness or death allowances for close family members (Gope *et al.*, 2017). Jia *et al.* (2017) indicated that monetary incentives increase workers' enthusiasm for sharing but in the long-term these methods do not have durability because they are limited to temporary obedience. Monetary incentives are financial incentives used by employers to motivate workers to meeting their aims. They offer incentives such as bonuses, pay rises and profit sharing.

8.5 MENTORING

In this study, 71 percent (40 of the 56) of the interviewees noted that their organisations have implemented mentoring for KM in the context of smart and sustainable strategies. Some of the key reasons for doing this cited by interviewees include very well known, easy to implement, simple, and cost effective. Mentors can share their experiences associated with smart and sustainable strategies (e.g., renewable energy, waste recycling), key contacts of sustainability experts (such as who to contact for help on particular sustainability issue), and knowledge of new sustainability issue (such as climate change).

Some key concerns cited by interviewees about mentoring include: resistance to outside training, employee cynicism, lack of reward structures for peer-mentoring and knowledge-sharing behaviours, and ineffectively pairing mentors with apprentices. The literature has also highlighted that, unlike other training methods, a mentoring relationship with the manager enables close supervision that helps in developing skills, gaining knowledge, and address gaps in the current ability (Nonaka and Takeuchi, 2011).

8.6 AFTER-ACTION REVIEWS

In this study, 68 percent (38 of the 56) of the interviewees noted that their organisations have implemented after-action reviews for KM in the context of smart and sustainable strategies. The most frequently cited benefit of this practice was the reduction of mistakes. The after-action reviews technique helps organisations learn immediately from errors and successes. The after-action review meetings capture key lessons learnt and best practices from participants at various levels (Anumba, *et al.*, 2005). For example: when significant project milestones are achieved or upon completion of a project or when an important action has been undertaken. Typical questions addressed during these meetings include: What was supposed to happen? What actually happened? What would we do differently in the future? The key lessons learned and best practices are captured and shared so that other teams could plan and act more effectively to avoid repeating mistakes.

8.7 NEWSLETTERS

In this study, 61 percent (34 of the 56) of the interviewees noted that their organisations have implemented newsletters for KM in the context of smart and sustainable strategies. Communication and knowledge sharing is key for successful deployment of smart and sustainable strategies. This holds true not only for internal stakeholders, like employees,

but also for the many external stakeholders (e.g., government, press) that are interested in society welfare. Therefore, Qatari organisations need to use simple and cost-effective techniques, like newsletters, to share knowledge with external and internal stakeholders to improve their image.

8.8 INTERNET

In this study, 54 percent (30 of the 56) of the interviewees noted that their organisations have implemented Internet for KM in the context of smart and sustainable strategies. The most frequently cited uses of the Internet include: for capturing (e.g. capturing renewable energy related best practices from external sources) and/or sharing (e.g. sharing community engagement strategies and performance with external stakeholders) knowledge associated with sustainability strategies. In today's complex economy, the state of Qatar needs to operate more efficiently in order to stay competitive. Seeking efficiency usually relates to knowledge initiatives for capturing and sharing experiences and best practices throughout the organisation in order to avoid unnecessary duplication and to reduce cost (Doppelt, 2010). Information and Communication Technology (ICT) is often an important part of achieving efficiency improvements (Ruggles, 1997).

8.9 WHATSAPP

In this study, 45 percent (25 of the 56) of the interviewees noted that their organisations have implemented the use of WhatsApp for KM in the context of smart and sustainable strategies. WhatsApp is considered a source for sharing knowledge within social media and it is an instant messaging application for smartphones. It allows users to exchange images, videos, and audio or written messages using their Internet connection. Therefore, it has positioned itself as a superior alternative to SMS messaging, which can be very

expensive when used in foreign countries due to roaming charges. Wankel (2016) noted that WhatsApp has been widely adopted on a global scale now and has been appreciated within organisations as well through which the knowledge has been efficiently shared internally within the organisation. Furthermore, in Qatari organisations, staff - especially younger members of staff - preferred to use WhatsApp to capture and share critical knowledge.

8.10 SUMMARY

It is not simply enough for knowledge to reside within an organisation, as knowledge that is not effectively utilised is essentially a wasted resource, instead knowledge needs to be actively managed. There are several mechanisms that can be used to manage public sector or private sector organisational knowledge. However, the challenge of managing knowledge is a daunting task for any organisation. An organisation's knowledge resources are complex and multifaceted, ranging from tacit components to knowledge that is explicitly represented. Providing access to key tacit and explicit knowledge to decision makers during potential changes seems to be critical for effective decision-making. Recent technological developments have made a significant and positive impact on the ability and desire to manage knowledge.

This chapter discussed the eight key strategies that have been implemented in managing knowledge in the context of smart and sustainable strategies. They are: sharing knowledge, capturing knowledge, incentives for KM, mentoring, after-action-review, newsletter, internet, and WhatsApp.

Overall, the following inferences and implications can be drawn:

- The scarcity of knowledge and expertise are a huge challenge for many Qatari public sector organisations. Therefore, training and education related to the management of knowledge will help leaders, managers, and change agents to better understand on how to craft and implement various KM strategies for managing smart and sustainable strategies.
- The implementation of KM in the context of smart and sustainable strategies is relatively low in Qatari organisations. Therefore, there is a need to reshape the existing KM strategy of Qatari public sector organisations in order to gain sustainable competitive advantage. Also, there is an urgent need to develop and deploy KM awareness programmes to improve understanding on the concept and benefits of knowledge. The research concludes that managing knowledge in the context of smart and sustainability is an integrated and complex process.
- The chapter concludes that to gain competitive advantage, it is necessary for Qatari public sector decision makers to recognise and use a blend of ICT and non-ICT based KM tools. It is advisable to use conventional, simple, low cost, and easy to use KM tools that need minimum training. It should be noted that KM tools roles are not mutually exclusive and Qatari public sector organisations may adopt any combination of them to tackle their particular issues or support particular motives.

Chapter 8 has addressed the fourth research objective, which is “to investigate and document the key knowledge management strategies in the context of smart and sustainable that are currently being implemented in Qatari organisations” and the fourth research question, which is “what are the key KM strategies in the context of smart and sustainable strategies currently being implemented in the Qatari public sector

organisations” of this study. The next chapter (Chapter 9) discusses the key challenges Qatari public sector organisations face in implementing smart and sustainable strategies.

CHAPTER 9 : CHALLENGES FOR IMPLEMENTING SMART AND SUSTAINABLE STRATEGIES IN THE STATE OF QATAR

9.1 INTRODUCTION

The purpose of this chapter is to present the key challenges Qatari organisations face in implementing smart and sustainable strategies. The results are based on the perceptions of 56 interviewees. The findings are also substantiated with the relevant literature. In this study, interviewees were asked to list and describe the key challenges Qatari organisations face in implementing smart and sustainable strategies in their organisations through face-to-face interviews. Table 9.1 presents seven challenges Qatari organisations face in implementing smart and sustainable strategies. In the order of challenge, they are: lack of knowledge and awareness, embedding culture for smart and sustainability, resistance to change, leadership for smart and sustainability, the technical challenges, citizen perspective, and managing stakeholders' knowledge. Each of these key challenges is discussed in detail from section 9.2 to 9.8. Finally, section 9.9 summarises the key findings. In doing so, Chapter 9 addresses the fifth research objective, which is “to critically appraise and document the main challenges the Qatari organisations face in implementing smart and sustainable strategies” and the fifth research question, which is “what key challenges do Qatari organisations face in implementing smart and sustainable strategies?”.

Table 9.1: Key challenges for implementation of smart and sustainable strategies in Qatar (N=56)

Sl. No	Key challenges for implementation of smart and sustainable strategies	Percentage of interviewees cited (N= 56)
1	Lack of knowledge and awareness	96% (54/56)
2	Embedding culture for smart and sustainability	91% (51/56)
3	Resistance to change	84% (47/56)
4	Leadership for smart and sustainability	84% (47/56)
5	The technical challenges	68% (38/56)
6	Citizen perspective	57% (32/56)
7	Managing stakeholders' knowledge	52% (29/56)

9.2 LACK OF KNOWLEDGE AND AWARENESS

Neef (2003) noted that providing key tacit and explicit knowledge to decision makers during incidents (e.g., accident at construction site) or potential crises (e.g., hurricane) seems to be critical for effective decision-making. Decision-making during incidents, such as workplace accidents, water crisis management processes, should involve consultation with an incident management team, made up of experts from a community of practice or a knowledge network, who are best able to analyse, debate, and help to agree on a course of action. The decision-making process, therefore, becomes much better informed and balanced, with contributions from people who understand the situation,

from experts who have experience with similar events, from those who can advise on scenarios and plans for resolution, and from the decision makers themselves. Therefore, access and speed are often crucial to the success of incident or potential crisis management. Therefore, managing knowledge associated with sustainability strategies may bring together critical tacit and explicit knowledge of individuals, team members, an organisation and its stakeholders, for effective decision making.

In this study strikingly, 96 percent (54 of the 56) of the interviewees noted that the lack of knowledge and awareness is Qatar's main obstacle on the road to sustainability. Despite coming from varying backgrounds, the interviewees highlighted issues and challenges close to the individual and called for proper sustainable education. A sustainability aware society will not materialise through awareness campaigns alone; more stringent measures, such as penalties and market mechanisms, are needed. Citizens should be at the forefront of awareness-building and behaviour-changing measures. Change can only start with this group, who wield power, shape societal norms and rules, and have a permanent stake and strong attachment to their native country. Once certain patterns and standards of behaviour are established, the transience of the non-national workforce will cease to be an obstacle for sustainably-sound behaviour and consumption.

The major parts of awareness in the strategic process are evaluating and building awareness of the relevance of sustainability within the organisation and developing a common language and understanding around sustainability. Building awareness often starts with a dialogue about some of the challenges the organisation is facing and how sustainability can help address the challenges. This leads to identification of where sustainability applies to the organisation and should go beyond the business (or cost

savings) case and look at internal operation and human resources to the perceptions of the organisation brand.

9.3 EMBEDDING CULTURE FOR SMART AND SUSTAINABILITY

Kluckhohn (1949) defined culture as “the set of habitual and traditional ways of thinking, feeling, and reacting that are characteristic of the ways a particular society meets its problems at a particular time”. This and other early definitions of social culture suggested that it is possible to mechanistically define ‘organisation culture’ and establish the relationships between organisation culture, change, and performance. Although Hofstede’s (1998) is extensively cited in literature relating to ‘national cultures’, his simplistic approach has, however, been criticised by others including McSweeney (2000). The complexity of organisational culture has been increasingly recognised and earlier simplistic notions of culture have been superseded (Price and Chahal, 2006).

In this study, 91 percent (51 of the 56) of the interviewees noted that key challenge for implementing smart and sustainable strategies is the difficulty in creating a culture. It was expected that smartness and sustainability was highly emphasised within organisations when looking at the external pressures facing companies such as QNV2030. An important aspect of embedding a culture within an organisation is to share responsibility of sustainability across the work force. This would allow all employees to work with a sustainable perspective. Given that sustainability has become part of the QNV 2030, every professional should have an understanding of the issue and requirements. Rake and Grayson (2008) stated that sustainability and corporate responsibility are required by everyone not given to a “good-works” department. This creates standards which all employees adhere to in order to create an embedded culture within the organisation.

Adopting a framework where sustainability is brought forward in employees' minds is something that allows for collaboration to be developed among the workforce bringing them together on a common goal. Training staff in sustainable issues would be an effective method to implement sustainability within an organisation, it allows for culture to be embedded through allowing staff to be familiarised with sustainability strategies. This is seen as the most crucial method to garner internal change, as stated by Strategic Direction (2012). Alongside training education of sustainable issues is also crucial. For instance, in order for a smart city to be successful, there must be various skills available in human resources; this is to ensure that the multiple aspects of a city are adequately addressed and that needs are met efficiently (United Nations, 2014). Human resource skills can include a broad range of skills such as: planning and design; data literacy; digital citizenship; implementation; and management. These skills are required to deal with the digital or data layer that is added onto any operation related to the smart infrastructure systems in a smart city (RAEng, 2012).

There are currently significant institutional shortcomings in capacity, culture, coordination, and outcomes, which ultimately relate to human capacity and values, and therefore require time to change. Qatar has only just begun working on these two areas, and it is therefore too early to judge. Still, the major concern is that the rate of positive change in the three areas (technology, values, and institutions) is not likely to catch up with accelerating growth and its negative impacts.

9.4 RESISTANCE TO CHANGE

O'Toole (2008) pointed out that people resist change due to the fundamental human objection to having the will of others imposed upon them. Most people prefer

predictability and stability in both their personal and professional lives. People typically avoid situations that upset order, threaten their self-interests, increase stress, or involve risk. When faced with changes to the status quo, people usually resist initially. Resistance continues and, in some cases, increases, until they are able to recognize the benefits of change and perceive the gains to be worth more than the risk or threats to their self-interests.

Change is a part of life. Change has intrigued, scared, excited, and mystified us for many centuries and continues to challenge individuals from all walks of life. In recent years within a business context, however, the term 'change' has also become synonymous with upheaval and chaos (Kotter, 1990). In this study, 84 percent (47/56) of the interviewees asserted that organisational resistance to change is another key challenge their organisations are facing for implementing smart and sustainable strategies. Some of the key reasons attributed for resistance to change include: too much work, lack of incentives, lack of recognition, lack of support from management, lack of expertise, and lack of training. Pfeffer and Sutton (2000) argued that fear is the greatest barrier to change, as it stifles the flexibility of thought and action that are vital to cope with internally chosen or externally driven change.

People resist change when according to Kotter(2012), they believe change is unnecessary or will make the situation worse; they fear that the change will mean personal loss - of security, money, status, friends or freedom; they have no input in the decision; the change was a surprise; they are not confident that the change will succeed; they feel manipulated because the changes were kept secret during the planning stage; they subscribe to the belief, "If it's not broken, don't fix it."; and they believe that the organization lacks the necessary resources to implement the change.

However, people support change when again according to Kotter (2012), they expect that it will result in some personal gain; they expect a new challenge as a result; they believe that the change makes sense and is the right thing to do; they were given an opportunity to provide input into the change; they respect the person who is championing the change; they believe it is the right time for the change.

Leaders should anticipate resistance to any effort for change, prepare for it, and make special efforts to assess and deal with individual reactions to change. Leaders must develop the proper attitude toward resistance to change and realize that it is neither good nor bad. In fact, resistance can serve as a signal that there are ways in which the attempt to change should be modified and improved. The following steps should help leaders faced with resistance to change: actively seek out people's thoughts and reactions to the proposed changes; listen carefully. Do not launch into lengthy diatribes justifying the change - in the early stages, people are not interested in that. They want to be heard and have their concerns attended to. Recognize that it takes time to work through reactions to change; engage people in dialogue about the change. Leaders should do this only after fully understanding the specific concerns of others. Also, it is important to unfreeze, transition, and refreeze people's behaviours to successfully implement and sustain change (Vora, 2013).

9.5 LEADERSHIP FOR SMART AND SUSTAINABILITY

In this study, 79 percent (44/56) of the interviewees noted that leadership is another key challenge their organisations are facing for implementing smart and sustainable strategies. Leadership for sustainability is about standing up for beliefs, challenging norms and pushing for what is right; the leader's job in making this happen is in providing

the inspiration, the permission and demonstration that principle-based working is worthwhile. As Doppelt (2010) suggested, these ingrained ideas often reside in the organisational culture, in policies and procedures, so the development and strategic nurturing of an alternate vision for the future, driven by committed management and leadership, is paramount. There is also a need to act as a role model and to convince others of the positive impact of a commitment to sustainability. Concurrently, there is a need to act as a change manager in reducing resistance to notions of sustainability (Marshall, 2004). Communication and influence on others are key ingredients when introducing a new change initiative, such as smart and sustainability concepts, into the organisation and challenging the dominant beliefs of the current system (Placet, *et al.*, 2005). Organisations with leadership towards innovation find themselves with a top management sponsorship towards the implementation of new technologic solutions (Burmeister *et al.*, 2015). Creating awareness of the possible benefits of smart devices among the decision makers of an organisation creates a change in leadership. Such change would give more awareness to the top management circle of the company of new means for innovation. The enrolment of the top management circle of an organisation leads towards the consideration and possible investment in new technologies.

There is a strong need to develop strategic leadership and management capabilities within modern organisations in order to meet the challenge of working effectively to promote not only economic, but also social and environmental forms of sustainable development. This is an area where an appropriate training has an important part to play in enhancing individuals' preparedness and abilities to change (Hansson *et al.*, 2003). Training should bolster efforts at communication by helping individuals to develop their contextual understanding in order to convey what is going on, and why. Bansal and Roth (2000) echoed the need to provide background sustainability-related training to overcome

employee confusion and uncertainty. To first attain employee awareness, and then participation, employees need an environmental training programme that transfers the necessary information to the work force.

Organisations cannot transform themselves unless most employees and even key stakeholders are willing to actively support and participate in the effort. Meaningful involvement often requires changing routines, adding extra duties and making other personal sacrifices. People will resist these changes unless they clearly understand the need, purpose, strategies, and expected outcomes of the effort and believe it will succeed and benefit the organisation and themselves. A tremendous amount of clear and easily understandable information and knowledge is needed to generate this type of understanding (Doppelt, 2010). Therefore, organisations must develop a strategy to engage with workforce. Since smart and sustainability are so new to many employees, training programmes are important vehicles of communication. Training programmes may help employees to grasp the vision and strategies at the intellectual level.

9.6 THE TECHNICAL CHALLENGES

In this study, 68 percent (38/56) of the interviewees noted that technology is another key challenge their organisations are facing for implementing smart and sustainable strategies. Technology use and implementation, as well as the consequences of this use for individuals and society, are some of the key challenges face smart and sustainable initiatives. The most frequently occurring challenges concern: privacy, security and interoperability. From a technology perspective, for instance, smart city embeds ICT within city infrastructure. In many cases, this includes diffusion of sensors and wireless sensor networks (WSN) in the city with the capability of real-time data gathering (Baccarne, *et al.*, 2014). This fusion of ICT and IoT (Zanella *et al.*, 2014), with urban

systems requires a high degree of interoperability. Interoperability refers to the ability of different systems to interact and share information. Heo *et al.*, (2014) noted that interoperability issues have to be solved in order for the smart city to become a reality. They concluded that tight and effective integration among city systems is a key challenge. This relates to the issue of accounting for future integration of additional systems that have to fit into the overall system architecture. Additionally, integration and collaboration are essential across different systems and components at different levels, hence, international standards are observed as vital in enhancing projects implementation. However, there is a lack in common standards for smart cities initiatives. Furthermore, Zanella *et al.* (2014) argued that non-interoperability is a major challenge because cities have many legacy systems and heterogeneous technologies that need to be welded together in order for the smart city to develop. It is evident that overcoming interoperability issues is crucial to smart city development.

9.7 CITIZEN PERSPECTIVE

In this study, 57 percent (32/56) of the interviewees noted that citizens' perspectives are another key challenge their organisations are facing for implementing smart and sustainable strategies. What is in for citizens in a smart and sustainable city? An integral component of developing a smart and sustainable city is to enhance government initiatives through citizen participation (Adapa, 2018). Citizens' demands are not encountered in challenging and changing environments. Administrators and citizens have to be involved in a participatory government to address technological innovations, real resource provisions, potential initiatives and maintain a sustainable environment (Adapa, 2018). Citizens need to be involved as stakeholders in the planning and policymaking process to provide views and give a perspective of their vision of smart and sustainable cities. Citizens' perspectives are a challenge that needs to be overcome in every smart

city plan. Involvement of citizens provides a better understanding of their needs and provides a better quality of life.

9.8 MANAGING STAKEHOLDERS' KNOWLEDGE

In this study, 52 percent (29 of the 56) of the interviewees stated that managing and capturing stakeholders' knowledge is most important challenge their organisations face. This may be due to an organisation's limited control over behaviours of stakeholders and certain stakeholders could simply have irreconcilable differences with one another based on ethical, religious, cultural, social or other issues. When the unique knowledge of various stakeholders is pooled and used to solve societal problems, however, new practices and strategies emerge that benefit all constituencies – just as entrepreneurship is recognised as the source of economic, environmental and social progress. Stakeholder collaboration can be viewed in this light as an extension of the entrepreneur's role to include stakeholders as active partners in value creation (Halal, 2000).

A sustainable organisation is one whose characteristics and actions are designed to lead to a “desirable future state” for all stakeholders. Sustainability issues requires the recognition of a wide range of stakeholders, including secondary ones (such as environmental groups) that are not directly involved in a market relationship but can still greatly affect a company's business (Hart and Sharma, 2004). The additional interacting pressures from social and environmental concerns make sustainability-related innovation more complex than conventional market-driven innovation.

9.9 SUMMARY

This chapter discussed the key challenges Qatari organisations face in implementing smart and sustainable strategies. Firstly, seven challenges Qatari organisations face in implementing smart and sustainable strategies were listed and discussed. The challenges are: lack of knowledge and awareness, embedding culture for smart and sustainability, resistance to change, leadership for smart and sustainability, the technical challenges, citizen perspective, and managing stakeholders' knowledge.

Overall, the following inferences and implications were documented:

- Creating knowledge and awareness, embedding culture for change, leadership for change, awareness about technical issues, citizen participation, and managing stakeholders' knowledge are key ingredients for successful deployment of smart and sustainable strategies.
- The process of developing and executing sustainability initiatives is particularly complex and challenging because of the holistic and integrated way that a very broad range of short-term and long-term issues needs to be considered, and broad array of stakeholders that must be engaged in an inclusive and collaborative manner. Therefore, a consistent, thought-through top management commitment is absolutely necessary for successful implementation of smart and sustainable strategies in Qatar.
- There are currently significant institutional shortcomings in capacity, culture, coordination, and outcomes, which ultimately relate to human capacity and values, and therefore require time to change. Qatar has only just begun working in these two areas, and it is therefore too early to judge. Still, the major concern is that the rate of positive change in three areas (technology, values, and

institutions) is not likely to catch up with accelerating growth and its negative impacts.

- Leaders should anticipate resistance to any change effort, prepare for it, and make special efforts to assess and deal with individual reactions to change. Leaders must develop the proper attitude toward resistance to change and realize that it is neither good nor bad. The lack of leadership skills for successful deployment of smart and sustainable strategies is one of the most important challenges for the Qatar organisations. Therefore, there is an urgent need to develop and deliver a bespoke training framework to address, improve and measure the effectiveness of leadership skills for driving change associated with smart and sustainable strategies in Qatar.
- Seven steps for fostering smart and sustainability leadership for Qatar include:
 1. Set targets worthy of an industry leader: Establishing truly ambitious goals is a first step of sustainability leadership. For instance, aiming to reduce carbon by 5 percent or 10 percent does not create significant movement away from ‘business as usual’ – real step change requires disruptive targets. Striving for carbon reductions of 50 percent or 60 percent can be daunting, but the challenge of meeting these intimidating goals is what forces real innovation.
 2. Reward sustainability behaviours: Qatari organisations took steps to reward the behaviours they wanted to see from their own staff; for example, by establishing awards schemes which recognised achievements in carbon reduction. Although many organisations have internal award schemes, few have seized their potential to formally acknowledge and incentivise carbon-reduction behaviours.

3. Lead through project governance: sustainability strategies have been incorporated into Qatari project governance structures; decision makers are forced to address sustainability issues must hit defined targets in order to pass certain gateways. Governance processes have been imposed from above, but they also give decision makers the opportunity and the permission to provide 'bottom-up' leadership by putting forward their innovative ideas.
4. Develop essential expertise and skills: Qatari leaders have to understand sustainability issues – and help others to understand it too. Internal masterclasses for staff and external workshops across the supply chain were held to build understanding and to stimulate thinking about sustainability issues, getting current leaders up to speed and incubating sustainability leadership among staff and supply chain.
5. Empower early adopters: Qatari organisations must turn employees who are passionate about sustainability issues into champions for the cause. Employees who are enthusiastic naturally lead by example, inspiring 'early followers' around them to replicate their efforts to address sustainability issue. Persuading naysayers to embrace new ideas requires massive effort for relatively small gain, whereas recognising and empowering employees who are natural sustainability-oriented leaders can expedite culture change. Eventually, everyone will get the message.
6. Communicate your aims and give permission: Innovation within Qatari businesses value chain needs to be invited and rewarded. It is not obvious to everyone that innovation is welcome – with suppliers saying they do not know how to put innovations forward for consideration by those higher up the supply chain or feeling that suggestions will be rebuffed. Intentions

and opportunities to create change must be clearly communicated by clients to their service and product suppliers, and from senior to junior staff.

7. Challenge your specifications: If Qatari organisations are inviting innovation, it is important that suppliers are able to challenge specifications. Specifications exist to assure compliance, but they can act as constraints as well as safeguards. Therefore, it is important to create a culture, supported by effective governance that enables suppliers to rethink standard products. It is well known that – when strong, clear leadership is provided and given the correct support – it is possible to push the limits repeatedly, cutting water consumption, energy consumption, carbon and cost without damaging revenue or profit.

- Citizens need to be involved as stakeholders in the planning and policymaking process to provide views and give a perspective of their vision of smart and sustainable cities.
- To address smart and sustainable issues, knowledge is increasingly being accessed and shared across value chain and national boundaries. Therefore, stakeholders' collaboration is essential for managing knowledge associated with smart and sustainable strategies.

This chapter has addressed the fifth research objective of the current study, which is “to critically appraise and document the main challenges Qatari organisations face in implementing smart and sustainable strategies”; and the fifth research questions, which is “what key challenges do Qatari organisations face in implementing smart and sustainable strategies?”. The next chapter (i.e., Chapter 10) discusses the development

and evaluation of an innovative business model for smart and sustainable strategies implementation in Qatar.

CHAPTER 10 : INNOVATIVE BUSINESS MODEL FOR IMPLEMENTING SMART AND SUSTAINABLE STRATEGIES

10.1 INTRODUCTION

This chapter presents an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations. The findings from the previous stages of this study were taken into consideration in the development of the model. The developed model uses the environmental, social and economic dimensions of sustainability as its foundation. The business model outlines the design of value creation delivery and capture for the organisation. It answers the questions: what is the value proposition of the service to the citizens? How the service will be used by the citizens? What is the market in which the product/service will be commercialised? How much will it cost to deliver the product or service? How will the organisation obtain revenues? The developed model provides broad guidance for the integration smart and sustainable strategies into day-to-day operational decisions. Section 10.2 discusses the rationale for the model. Section 10.3 discusses the proposed model, while section 10.4 summaries the key benefits of the framework.

This model is intended to offer guidance for the successful implementation of smart and sustainable strategies to simultaneously improve environmental, social and economic performance. In doing so, chapter 10 addresses the sixth research objective of this current study, which is “to develop and validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations” and research question sixth, which is “Is there a need for developing and validating an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations?”.

10.2 RATIONALE FOR DEVELOPING AN INNOVATIVE BUSINESS MODEL FOR IMPLEMENTING SMART AND SUSTAINABLE STRATEGIES

The business model concept is an abstract representation of the value flow and the interactions between value elements of an organisational unit. The essential value elements of organisations are concerned with proposition, creation, delivering, and capturing value. For this purpose, the concept of a business model appeared to facilitate the explanation of complex business ideas more efficiently (Nosratabadi *et al.*, 2019). Sustainability issues, like growing inequality and the deterioration of our natural livelihood make the transformation to a more sustainable economic system increasingly desirable (Geissdoerfer *et al.*, 2018b). In the past decade, research on sustainable innovations has expanded rapidly to increase our understanding of the ways in which new technologies and social practices enable societies to become more sustainable (Boons and Lüdeke-Freund, 2013).

Boons and Lüdeke-Freund (2013) noted that, while an innovation is often distinguished from an invention by the additional condition of successful market introduction, the actual way through which firms succeed in bringing an invention to the market is relatively unexplored (Teece, 2010; Chesbrough, 2007). While this issue is gaining increasing attention in “mainstream” literature (Baden- Fuller *et al.*, 2010), it is still underexplored in the field of sustainable innovation (Schaltegger *et al.*, 2011; Wells, 2013; Boons and Lüdeke-Freund, 2013).

Geissdoerfer *et al.* (2018b) presented a detailed review of the different types and various definitions of business models, where a vast number of definitions are presented. The model of an organizational system (Baden-Fuller and Morgan, (2010), a simplified

characteristic of the business concept (Teece, 2010) and a reduced scope of business (Doganova, and Eyquem-Renault, 2009) are suggested as the various types of business models. For decades, vital sustainability issues with their major societal and environmental effects influencing human beings and nature were not the priorities of most business model types. Nevertheless, business models, for achieving the sustainability goals of companies, have finally become under pressure to transform into a more sustainable economic system (Nosratabadi *et al.*, 2019).

Business strategy and management disciplines are increasingly incorporating sustainable development into their long-established assumptions and frameworks, stimulating rich, new and diverse fields of study (Winn and Kirchgeorg, 2005), and rethinking the theoretical foundations and the practice of business strategy (Hahn *et al.*, 2010). Theoretical and practical approaches to sustainability have been proposed with some common properties: improving sustainability often implies change, innovation or adjustment of an entity in relation to its surroundings or supporting environment (Faber *et al.*, 2005). The ability to innovate in the domain of sustainability represents a necessary business capability, whether related to small incremental steps or to radical, disruptive innovations. Business model innovation is emerging as a potential mechanism to integrate sustainability into business (Schaltegger *et al.*, 2011; Evans *et al.*, 2017).

However, technological advances towards sustainability are increasingly incremental, and many companies find it difficult to meet their sustainability targets. Therefore, innovation on the business model level is required to align incentives and revenue mechanisms to leverage sustainable solutions (Geissdoerfer *et al.*, 2018b). Business model innovations are suspected to yield higher returns than product or process innovations (Lindgardt *et al.*, 2009), and sustainable business models might have the

additional benefit of higher risk mitigation and resilience and yield additional diversification and value co-creation opportunities (Porter and Kramer, 2011). To realise these advantages, organisations have become increasingly interested in implementing sustainable solutions (Geissdoerfer *et al.*, 2018b). However, many business model innovations fail. This has serious economic implications for companies and leads to considerable delays in the adoption of sustainable solutions. Despite the importance of these issues, the reasons for failure remain relatively unexplored.

There is a lack of clarity, conceptual consensus, and consistency in the use of the terms ‘business model’, ‘business model innovation’ and ‘sustainable business models’ (SBMs) (Magretta, 2002; Boons and Lüdeke-Freund, 2013), and a lack of established theoretical grounding in economics or business studies (Teece, 2010). Moreover, there is no general agreement on the characterisation, classification and boundaries of these concepts (Spieth *et al.*, 2014), which results in dispersion of perspectives and significantly slows down and even hampers progress in these fields (Zott *et al.*, 2011). The lack of theoretical grounding is also reflected in the scarce number of case studies and empirical analyses in the field. There is a paucity of empirical research on business models, business model innovation and sustainable business model innovation (Stubbs and Cocklin, 2008; Schaltegger *et al.*, 2011). The lack of case studies makes it challenging for firms to understand how to innovate their business models, identify and design alternatives, then assess and select the most adequate one. When considering business model innovations for sustainability, this leads to a higher complexity related to how to preliminarily assess the impact of the sustainability innovations and how to understand their effects on the whole business network (Evans *et al.*, 2017). Therefore, a model is required that allows executives to identify emerging smart and sustainability issues, assess the impact of the company’s ties

on all its key stakeholders, measure the business value of relevant smart and sustainability initiatives, and capture that value.

In this study, during face-to-face interviews, interviewees were asked the need for an innovative business model for implementing smart and sustainable strategies in the Qatari public sector organisations. Of the interviewees, overwhelmingly, 100 percent (56 of the 56) noted the need for an innovative business model for implementing smart and sustainable strategies. Many interviewees noted that their executives are familiar with managing traditional financial values. However, their executives are less knowledgeable about developing, deploying, managing and measuring social and environmental issues and values. In this study, the interviewees echoed that existing tool kits and methodologies are still novel, confusing and relatively unknown to many organisations. According to the interviewees, a business model should incorporate core objectives such as generation of economic value, environmental value and social value. It is evident from the above discussion that there is a need for an innovative business model for implementing smart and sustainable strategies in Qatari public sector organisations.

10.3 DEVELOPING AN INNOVATIVE BUSINESS MODEL FOR IMPLEMENTING SMART AND SUSTAINABLE STRATEGIES

Identifying business models as a means of creating value through sustainable innovations requires a clear understanding of the unit of analysis. Boons and Lüdeke-Freund (2013) distinguished the following elements of a generic business model concept: value proposition: what value is embedded in the product/service offered by the firm; supply chain: how are upstream relationships with suppliers structured and managed; customer interface: how are downstream relationships with customers structured and managed?

Baden-Fuller and Morgan (2010) underlined that from a holistic and systemic concept, a business model perspective may be expected to contribute to a sustainable business model innovation agenda by opening up new approaches to overcoming internal and external barriers. Although there is a growing body of literature analysing and discussing sustainability and sustainable development on the political and society levels (Dryzek, 2005), the operationalisation of the concept in relation to business and on the corporate level is still rather weak (Bansal, 2005; Carroll and Shabana, 2010). The most common translation of sustainability into organisation level is the triple bottom line, which consists of three sustainable dimensions: economic, social and environmental (Elkington, 1997) and is described as three equally important managerial principles of sustainable business models (Schaltegger and Wagner, 2011).

According to Charter and Clark (2007), sustainable innovation is a process where sustainability considerations (environmental, social and financial) are integrated into organisation systems - from idea generation and development and commercialisation. This applies to products, services and technologies, as well as to new business and organisational models. The main question here is, therefore, “what can innovation do for sustainability?” In this context it is no longer enough for an innovation to be novel and original in its technical features – it has to be novel and original in terms of environmental or social sustainability as well (Phills *et al.*, 2008).

Bocken *et al.* (2014) noted that innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way the organisation and its value-network create, deliver value and capture value (i.e., create economic value) or change their value propositions.

Chou *et al.* (2015) argued that sustainability is considered to be an integrated part of company value propositions and stated that: “Company policies and brand image are driven by value propositions. The company mission reflects the core business value and competitive strategy, and the sustainability vision implies the direction of social responsibility the company intends to pursue. These two factors should be linked in order to produce clear, sustainability-led value propositions”.

Lovins *et al.* (1999), for example, proposed a four-step agenda to align business practice with environmental needs, which they labelled “Natural Capitalism”. The four steps constitute an increase of natural resources’ productivity, an imitation of biological production models, a change of business models, and reinvestment in natural capital.

Yunus *et al.* (2010) questioned that for social businesses to evolve, a specific business model framework is needed that integrates a social profit equation. They presented a number of key components, which go into explaining and developing a social business models: social profit equation (social profit and environmental profit); value constellation (internal value chain and external value chain); value propositions (stakeholders and product/services), and economic profit equation (sales revenues, cost structure, and capital employed). According to their concept, social businesses apply business models that above all recover their full costs and pass profits on to customers, who benefit from low prices, adequate services, and better access to maximize the social profit equation. Yunus *et al.* (2010) referred to this as: “a no-loss, no-dividend, self-sustaining business that offers goods or services and repays investments to its owners, but whose primary purpose is to serve society and improve the lot of the poor”.

10.4 PROPOSED BUSINESS MODEL CANVAS

The Business Model Canvas is a framework created for describing, analysing and designing business models. The model provides an analysis of the conventional and smart and sustainable business models of different public services. The model gives an insight into different aspects including the environmental and social issues. Moreover, this framework presents a clear description of the elements comprising a business model. The proposed canvas comprises nine elements, which cover the four main areas of a business: customers, offer, infrastructure and financial, viability. These elements are depicted and described in Table 10.1.

Table10.1: Proposed business model building blocks

Pillar	Business model building block	Description
Product/service	Value proposition	Gives an overall view of an organisation's bundle of products and services.
Customer interface	Target customer	Describes the segments of customers an organisation wants to offer value to.
	Distribution channel	Describes the various means of the organisation to get in touch with its customers
	Relationship	Explains the kind of links an organisation establishes between itself and its different customer segments.
Infrastructure management	Value configuration	Describes the arrangement of activities and resources
	Core competency	Outlines the competencies necessary to execute the organisation's business model.
	Partner network	Portrays the network of cooperative agreements with other organisations necessary to efficiently offer and commercialise value.
Financial aspects	Cost structure	Sums up the monetary consequences of the means employed in the business model.
	Revenue model	Describes the way an organisation makes money through a variety of revenue flows.

The canvas allows organisations to analyse their project business models; that is to say, its main function is to help to generate profit/ an improved quality of life to citizens. This framework is suitable for public administrations as the provision of an improved quality of life to citizens is usually a priority over the generation of economic benefits. It can be used, for instance, in the case of smart cities, which pursue social achievements (regarding aging population, health, etc.) or environmental goals like reducing environmental

footprint of their activities. When analysing public services through the canvas, the position the business model of the service provider. However, usually several stakeholders participate in the provision of public services (city councils, private sector, citizens, etc.). For instance, in the waste management of the city, three main actors taking part in the aggregation (the city council, the company hired to provide the service and the citizens). The citizens (users of the service) are the customers of the aggregation but, at the same time, the company will consider the city council as its customer, thus the city council is part of the aggregation as well as any customer.

Key partners	Key Activities	Value proposition	Customer relationships	Customer segments
	Key resources		Channels	
Cost structure		Revenue streams		
Social and Environmental cost		Social and Environmental benefit		

Figure 10.1: Proposed business model canvas

The business models of some of key public services (waste management, water supply, traffic management, street lighting, city incidence management, public gardens and parks irrigation system and citizen participation management) relying on conventional operation models were compared with the ones resulting from the integration of smart and sustainable technologies.

Key partners <ul style="list-style-type: none">• City council• Waste management company• Truck and container providers• Processing plant equipment providers• Smart infrastructure providers• Users, as they inform about damaged containers and manage personal waste using the mobile applications	Key Activities <ul style="list-style-type: none">• Waste collection• Waste processing• Recycled waste sales• Management of information collected by sensors through the big data platforms	Value proposition <ul style="list-style-type: none">• Quality service for waste collection, at lower economic costs and low environmental impact.	Customer relationships <ul style="list-style-type: none">• Users dispose waste in containers (self-service relation)• Users inform about damaged bins and managing personal waste using mobile applications• Personnel and exclusive assistance from the waste management company	Customer segments <ul style="list-style-type: none">• Citizens/users• The city council• The companies that buy waste to process recycled waste
	Key resources <ul style="list-style-type: none">• Employees (Bin men, administration staff)• Trucks and containers• Waste processing plant• Smart infrastructure• Sensors and data management		Channels <ul style="list-style-type: none">• Promotional materials (newsletters, websites, brochures)• News in the media• Citizens information services• Public conferences, workshops• Awareness on waste management Applications	
Cost structure <ul style="list-style-type: none">• Employee salaries• Transport expenditure (trucks, fuel and containers, platform and smart sensors)• Waste processing plant• Smart infrastructure management cost• Sensors and data management cost		Revenue streams <ul style="list-style-type: none">• The city council uses collected taxes to pay the service provider a subscription fee• Recycled waste sales		
Social and Environmental cost <ul style="list-style-type: none">• Energy consumption and environmental impact using smart devices		Social and Environmental benefits <ul style="list-style-type: none">• Lower service cost should allow tax reduction• Quality job creation to manage the service (highly qualified)• Stimulates economic activity• A clean city attracts investments• Less energy consumption• Urban healthiness reduces public health problems		

Figure 10.2: Proposed business model canvas for smart city waste management as an example

The value proposition is the core of the business model, therefore, organisations focus their efforts on creating the best value proposition the business can offer, delivering it and capturing the value from it. A well designed and executed value proposition leads

organisations to competitive advantage as they are able to add more value or solve issues of the citizens in a better way (Wirtz *et al.*, 2016). For instance, the use of smart devices allows a greater efficiency in waste management service development, resulting in an optimisation of the waste collection frequency and subsequently improving fuel economy. Dealing effectively with city waste is important for smart and sustainable city design. Smart devices allow gathering information from every waste collection point, which can be used to characterise waste production, collection, and disposal, thus contributing to service and resource optimisation.

Accurate customer segmentation has the potential of deciding if a value proposition would be successful on the market and provide the firm with competitive advantage (Teece, 2010). For instance, in the city's waste management, citizens/users, the city council, and the companies that buy waste to process recycled waste are the key customer segments. When a firm innovates on the traditional methods of reaching its customer segments to deliver the value proposition, it is able to create different forms of value. For instance, the waste management company provide great examples of how business as transformed by developing new channels of distribution like promotional materials (newsletters, websites, brochures), news in the media, citizens information services, public conferences, and workshops on waste management mobile applications.

The customer relationship dictates the way an organisation establish with the customer segments and the interactions between them can vary from personal interactions with the consumer to completely automated interactions in some cases. For instance, for waste management company, users provide information in real time on their location, characteristics and fill levels. The management of this information allows the planning of collection routes according to the location of full containers, instead of the predefined

routes existing in the conventional service. Additionally, both the garbage trucks and other cleaning devices have appliances that gather information about the route followed, the activity carried out and the time involved. This system of smart waste management includes mobile applications, which allows citizens to know the fill level of bins and containers, the collection routes and timetables, as well as to communicate the service any incident informing about its location. This way users contribute to enhancing the service's efficiency, since the information gathered through the application allows them to plan the appropriate moment to dispose their waste.

Fliegner (2017) argues that key resources for a firm's business model must be associated with its cost structure in the same way the cost of the activities performed by the organisation to deliver the product occurs from the consumption of resources. Key resources for the waste management example include: employees (bin men, administration staff), trucks and containers, waste processing plant, smart infrastructure and sensors and data management infrastructure.

Transformation of key activities has a direct impact on the resources required to execute the activities and subsequently their costs. Key activities for the waste management example include: waste collection, waste processing, recycled waste sales, and management of information collected by sensors through the big data platforms. Strengthening of the relationship with key partners is related to the organisation's value network optimization and performance. Collaboration in the value network to deliver a value proposition assists to reduce risks and resources acquirement. Key partners for the waste management example include: city council, waste management company, truck and container providers, processing plant equipment providers, smart infrastructure

providers, and users, as they inform about damaged containers and manage personal waste using the mobile applications.

The development of the relationships with key partners when value proposition innovation might result in the necessity for new resources from the key partners or great amount of currently used resources is important for success. Key customer relationships for the waste management example include: users dispose waste in containers (self-service relation), users inform about damaged bins and managing personal waste using mobile applications, and personnel and exclusive assistance from the waste management company.

The revenue streams mechanism designed by considering the price customers are willing to pay in each customer segment allows an organisation to increase the profitability of every customer segment. Key revenue streams for the waste management example includes: the city council uses collected taxes to pay the service provider a subscription fee and recycled waste sales. Cost structure is important for the financial results of the organisation; therefore, it has direct impact on profits. Key cost structures for the waste management example include: employee salaries, transport expenditure (trucks, fuel and containers, platform and smart sensors), waste processing plant cost, smart infrastructure management cost, energy cost, sensors cost and data management cost.

Teams working on new ideas need to make an effort to always increase societal and environmental benefits in addition to the economic gain achieved by the business (Bocken *et al.*, 2014). Business model innovations for sustainability have been defined by Bocken *et al.* (2014) as innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way

the organisation and its value-network create, deliver and capture value (i.e., create economic value) or change their value propositions. Key social and environmental benefits for the waste management example include: lower service cost should allow tax reduction, quality job creation to manage the service (highly qualified), stimulates economic activity, a clean city attracts investments, less energy consumption, and urban healthiness reduces public health problems.

10.5 VALIDATION OF THE BUSINESS MODEL

Validation is defined as an assessment of whether a model is in congruence with reality (Brink, 2003). The process tries to ensure that the model represents the characteristics of the general population and not limited to the samples used in the estimation (Good and Hardin, 2003). That is, if the model is applied to a different sample and there is a severe drop in its predictive power, then the model clearly does not generalise (Field, 2000).

As stated in chapter 4, in this study, the developed business model was validated with five senior professionals from five Qatari public sector organisations. The professionals had over ten years of work experience in public sector management. In this study, during face-to-face interviews, the interviewees were asked about the comprehensiveness of the developed business model. Most of the interviewees asserted that the business model has a very high degree of comprehensiveness and in terms of areas covered; the developed model has a very high level of smart and sustainable issues. Interviewees were of the view that it has high level coverage of environmental, social and economic sustainability competitiveness variables. Furthermore, the interviewees were asked if they thought the business model would help their organisations to implement smart and sustainable strategies and the response from all interviewees was very positive. The developed model provides broad guidance for the integration of smart and sustainable strategies into day-

to-day operational decisions. This model is intended to offer guidance for the successful implementation of smart and sustainable strategies to simultaneously improve environmental, social and economic performance. It was very interesting to note that all five interviewees were keen in piloting the business model in their organisations. The model can be further tested and revised. Overall, discussion of the business model and its validation attempted to address objective 6 of this research study.

10.6 SUMMARY

This chapter has discussed the innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations. The business model outlines the design of value creation, delivery, and capture for the organisation. The developed model provides broad guidance for the integration smart and sustainable strategies into day-to-day operational decisions. This model is intended to offer guidance for the successful implementation of smart and sustainable strategies to simultaneously improve environmental, social and economic performance. It is concluded that future research has to address several theoretical, conceptual, and methodical issues to move towards a full sustainable business model pattern language. A future research agenda should consider: how to consolidate the available knowledge on sustainable business model patterns, and how to convert it into “knowledge for action”; how to identify and systematise the various connections between different sustainable business model patterns to create an overarching structure; which methods are best suited to develop sustainable business model classifications, both typologies and taxonomies; how to test the effectiveness of sustainable business model patterns as an additional element of business model innovation tools? In doing so, chapter 10 addressed the sixth research objective of this current study, which is “to develop and validate an innovative business model for implementing smart and sustainable strategies for the benefit of Qatari

organisations” and the sixth research question, which is “is there a need for developing and validating an innovative business to develop and validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations”? The next chapter (i.e., Chapter 11) presents the findings and also provides conclusions and recommendations.

CHAPTER 11 CONCLUSIONS AND RECOMMENDATIONS

11.1 INTRODUCTION

This chapter presents the research aim and objectives. To do so the research process is described, and the conclusions and recommendations are provided.

11.2 RESEARCH PROCESS

Aim	The aim of this research is to investigate how Qatari public sector organisations are embedding smart and sustainability strategies in order to achieve the National Vision 2030.
Research Objectives	<ul style="list-style-type: none">• To explore and document the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations• To investigate and document the key sustainable initiatives needed to effect change that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030• To explore and document the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda• To investigate and document the key knowledge management strategies in the context of smart and sustainable that are currently being implemented in Qatari organisations• To critically appraise and document the main challenges Qatari organisations face in implementing smart and sustainable strategies• To develop and validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations
Research questions	<ol style="list-style-type: none">1. What are the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations?2. What are the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030?3. What are the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda?4. What are the key KM strategies in the context of smart and sustainable strategies currently being implemented in Qatari public sector organisations?5. What key challenges do Qatari organisations face in implementing smart and sustainable strategies?6. Is there a need for developing and validating an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations?
Research	Qualitative research
Sample technique	Purposive sample
Sample size	56
Sample diversity	Directors, advisors and managers responsible for implementing Qatar National Vision 2030
Data collection method	Semi-structure interviews
Unit of analysis	Public sector organisations
Embedded unit of analysis	Individual employees
Method of analysis	Content analysis
Outcome of analysis	An innovative business model for implementing smart and sustainable strategies

11.3 KEY FINDINGS

Research Objective 1: To explore and document the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations

Research Question 1: *What are the key reasons for implementing smart and sustainable strategies in Qatari public sector organisations?*

Six key reasons for implementing smart and sustainable strategies in Qatari public sector organisations. They are: Qatar National Vision 2030, improved decision-making, to reduce operating cost, to improve water efficiency, to improve transport infrastructure, and to develop safe and sustainable communities. Sustainability has always been difficult to assess directly, since it is an abstract and multidimensional concept. Therefore, organisations face significant challenges in taking the first steps towards implementing smart and sustainable strategies.

Research Objective 2: To investigate and document the key sustainable initiatives needed to effect change that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030

Research Question 2: *What are the key sustainable strategies that are currently being implemented in Qatari public sector organisations to achieve the National Vision 2030?*

Ten key sustainable strategies that have been implemented in Qatari public sector organisations. In the order of implementation, they are: sustainable water management strategies, renewable energy strategies, sustainable sports strategies, resources efficiency strategies, electric vehicles (EVs) strategies, Industry 4.0 strategies, health care strategies, sustainable workforce development strategies, smart village strategies, and sustainable mobile apps.

Research Objective 3: To explore and document the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda

Research Question 3: *What are the key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda?*

Seven key smart cities strategies that have been implemented to achieve Qatar's smart cities agenda are: smart energy management strategies, smart water management strategies, smart waste management strategies, smart transport strategies, smart education strategies, smart buildings strategies, and governance models for smart cities strategies.

Research Objective 4: To investigate and document the key knowledge management strategies in the context of smart and sustainable that are currently being implemented in Qatari organisations

Research Question 4: *What are the key KM strategies in the context of smart and sustainable strategies currently being implemented in Qatari public sector organisations?*

Eight key strategies that have been implemented in managing knowledge in the context of smart and sustainable strategies in Qatari public sector organisations are: sharing knowledge, capturing knowledge, incentives for KM, mentoring, after-action reviews, newsletters, Internet, and WhatsApp.

Research Objective 5: To critically appraise and document the main challenges the Qatari organisations face in implementing smart and sustainable strategies

Research Question 5: *What key challenges do Qatari organisations face in implementing smart and sustainable strategies?*

The seven challenges Qatari organisations face in implementing smart and sustainable strategies are: lack of knowledge and awareness, embedding culture for smart and sustainability, resistance to change, leadership for smart and sustainability, the technical challenges, citizen perspective, and managing stakeholders' knowledge.

Research Objective 6: To develop and validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations

Research Question 6: *Is there a need for developing and validating an innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations?*

An innovative business model for smart and sustainable strategies implementation for the benefit of Qatari organisations was developed and validated. The findings from the previous stages of this study were taken into consideration in the development of the model. The developed model uses the environmental, social and economic dimensions of sustainability as its foundation. The business model outlines the design of value creation delivery and capture for the organisation.

11.4 CONCLUSIONS AND RECOMMENDATIONS

- Qatari organisations face significant challenges in taking the first steps towards implementing smart and sustainable strategies. For instance, understanding the underlying concepts of sustainability, changing the attitudes of employees and customers, as well as new policy or legislation which encourages the uptake of the sustainability agenda is a challenge. To improve sustainability performance, therefore leaders have to recognise and better understand the concept of sustainability.
- A complex mix of government, economic, social and environmental forces drive Qatari organisations to implement smart and sustainable strategies.
- Before organisations embed sustainability initiatives they need to understand and recognise key drivers, which are pushing them towards implementation. Therefore, understanding the drivers for implementing smart and sustainable strategies is important.

- More effective integration and knowledge sharing within and across smart and sustainable strategies and projects is required. Establishing a collaborative network with both internal and external stakeholders would be pivotal and should be addressed thoroughly.
- Understanding the level of importance of the different drivers can help organisations prioritise and align processes and resources accordingly to ensure success. It could assist decision makers to develop smart and sustainable strategies based on the drivers.
- Overall, the outlook for improved sustainable strategies efforts from the state of Qatari public sector organisations looks quite promising at present. This is because organisations that implement sustainable strategies will benefit from improved reputation, better employee engagement, lower operating costs, and better relationship with key stakeholders. Clear and strong branding should improve the public perception of the quality of services that public sector offers, and this in turn, will increase the trust, loyalty and will help reducing the perceived risk.
- The current study results suggest that, to meet the goals of the QNV2030, the implementation of healthcare strategies is still evolving in the State of Qatar. Changes in demographics, shortage of clinicians and more people living with multiple healthcare conditions have greatly increased demand on healthcare services. However, Qatar has not invested in building capacity growth in the healthcare management. Therefore, there is a need to re-examine the National Health Strategy to Qatar's health challenges, aligned to a global shift in thinking towards population health and more smart and integrated care.
- Growing global interest in sport development to accelerate the transition to sustainable development and societal well-being, an increasing number of Qatari

sports organisations are obliging themselves to adopt such a move; hence, sports bodies have started to make sustainability a great corporate agenda priority, bearing in mind that embedding sustainable strategies in the sport sector would encourage public commitment to protect the environment and society. However, the Qatari sports sector is still in the developing stage. Therefore, Qatari sports organisations should be ahead of many different industries due to the features they have at their disposal and the ability to generate social awareness worldwide. The Qatari sports sector must take leadership in sustainability strategies.

- Industry 4.0 has enormous potential to enable Qatari public and private sector organisations systems and processes to be automated. Rough estimates say the Industry 4.0 market could exceed US\$ trillions in just a few years' time. However, this will require Qatari manufacturers to make bold investments in the equipment, integrated systems, training, and organisational capabilities needed to truly embrace the Industry 4.0 revolution.
- Climate change will impact Qatar by enhancing ecological and physical vulnerabilities, as well as economic vulnerabilities. Qatar is taking a range of actions to reduce its greenhouse gas emissions and to position itself as a leader in the development of climate change and clean energy technologies. However, carbon emissions reduction strategies are in their infancy. There seems to be a significant knowledge gap relating to combat carbon emissions. Therefore, sharing best practices related to carbon emissions reduction practices from other countries and academic research institutes is essential.
- Domestically, Qatar has a renewable energy goal of sourcing 20 percent of the country's total energy from renewable sources by 2024. New business models must be nurtured to capture the benefits of the renewables; however, the business

models that will be investigated to work on the innovation interface represent only some possible future models.

- There is widespread hope that, in Qatar, green policies will develop and that will stimulate new economic growth and lead to higher income and employment. However, such positive outcomes will only be achieved if the labour market is supported by appropriate policies, such as those providing retraining in relevant skills, including entrepreneurship and apprenticeships for green jobs.
- The evolving concept of Smart Villages signifies to rural territories and communities which shape their existing strengths and resources, as well as on developing new initiatives. Therefore, there is a need for implementing more smart village strategies in Qatar. Furthermore, there is a need to develop and implement a national smart village agenda.
- The scarcity of knowledge and expertise associated with sustainable strategies is, and will continue to be, a huge challenge for Qatari public sector organisations. Therefore, training programmes related to the management of smart and sustainable related knowledge will help leaders, managers, and change agents to better understand how to craft and implement various smart and sustainable strategies to achieve QNV 2030.
- It is concluded that smart and sustainable issues are complex, dynamic, and multifaceted. Most of the smart and sustainable goals are inherently collaborative, as they relate to supporting the community and future generations. Therefore, to solve some of Qatar's sustainability problems, it is important that key leaders and decision makers connect with other stakeholders to have a positive social impact.
- With Qatari cities becoming increasingly globalised and competitive and moving towards knowledge-based economy, the concept of smart cities is attracting interest from Qatari city officials, the private sector, local communities, and

academia. Therefore, the use of technology alone does not make Qatari cities smarter – other dimensions including cultural and natural amenities, people and skills, knowledge precincts and governance are equally important and must be addressed.

- It is suggested that for Qatar, in order to create smart cities and to make sustainable communities, it is necessary that organisations are involved in activities that help them to establish strong relationship with the policymakers, companies, entrepreneurs, and citizens.
- It is concluded that cities are complex systems that are characterised by massive numbers of interconnected citizens, businesses, different modes of transport, energy and water systems, communication networks, services and utilities. Population growth and increased urbanisation raise a variety of technical, social, economic, and organisational problems that tend to jeopardize the economic and environmental sustainability of cities. The rapid growth has generated traffic congestion, pollution, and increasing social inequality. Therefore, the focus has been on the way new technology-based solutions, as well as new approaches to urban planning and living, can assure future viability and prosperity in urban areas.
- Modern digital and telecommunication technologies influence urban development. Whilst such big data analytics offer a number of opportunities, they also raise a number of concerns and challenges. The conversion of Qatar's old municipal regions into smart cities is a topical problem, representing an actual problem for many aspects of urban infrastructure, such as building construction, renovation and reconversion, municipal public transport and facilities.
- The scarcity of knowledge and expertise a huge challenge for many Qatar public sector organisations. Therefore, training and education related to the management

of knowledge will help leaders, managers, and change agents to better understand on how to craft and implement various KM strategies for managing smart and sustainable strategies.

- The research concludes that managing knowledge in the context of smart and sustainability strategies is an integrated and complex process. The implementation of KM in the context of smart and sustainable strategies is relatively low in Qatari organisations. Therefore, there is a need to reshape the existing KM strategy of Qatari public sector organisations in order to gain a sustainable competitive advantage. Also, there is an urgent need for developing and deploying KM awareness programmes to improve understanding on the concept and benefits of knowledge.
- This research concludes that to gain competitive advantage, it is necessary for Qatari public sector decision makers to recognise and use a blend of ICT and non-ICT based KM tools. It is advisable to use conventional, simple, low cost, and easy to use with minimum training needs KM tools. It should also be noted that the roles of KM tools are not mutually exclusive and Qatari public sector organisations may adopt any combination of them to tackle their particular issues or support particular motives.
- The developed innovative business model provides broad guidance for the integration smart and sustainable strategies into day-to-day operational decisions. This model is intended to offer guidance for the successful implementation of smart and sustainable strategies to simultaneously improve environmental, social and economic performance.

11.5 FUTURE WORK

This research study has revealed a number of areas for further research and development including the following areas:

- Given that the research reported here is largely exploratory by nature and participants were managers, advisers, and directors only, the results presented are only tentative and of limited value for the purpose of generalisability.
- Furthermore, the findings of this research are limited to Qatari public sector organisations only; as such, the level of generalisability outside this context may be very limited. However, we argue that the results obtained are useful to similar developing countries.
- Extending this study using a larger sample with more balanced representation across different public sector organisations can provide the relevance of these findings to other countries' public sector organisations.
- It is recommended that future research addresses several theoretical, conceptual, and methodical issues to move towards a full sustainable business model pattern language. A future research agenda should consider: how to consolidate the available knowledge on sustainable business model patterns, and how to convert it into "knowledge for action"; how to identify and systematise the various connections between different sustainable business model patterns to create an overarching structure; which methods are best suited to develop sustainable business model classifications, both typologies and taxonomies; how to test the effectiveness of sustainable business model patterns as an additional element of business model innovation tools?

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APPENDIX A: PROTOCOL FOR SEMI-STRUCTURED INTERVIEWS

ADOPTION OF SMART AND SUSTAINABLE STRATEGIES IN THE STATE OF QATAR

SEMI-STRUCTURED INTERVIEW QUESTIONS

Date	
Time of interview	
Organisation	

Name of Interviewee
Position of Interviewee
Organisation total employee size
<ul style="list-style-type: none">• Please kindly tell me a little about what your current job role is in the organisation?	
<ul style="list-style-type: none">• Given your role in this organisation, please explain me the key reasons for implementing smart and sustainable strategies in your organisation?	
<ul style="list-style-type: none">• From the job role and responsibilities that you perform in this organisation, please, describe key sustainable strategies that are currently being implemented in your organisation to achieve the National vision 2030.	
<ul style="list-style-type: none">• From the job role and responsibilities that you perform in this organisation, please, enlighten key smart cities strategies that have been implemented in your organisation to achieve Qatar smart cities agenda	
<ul style="list-style-type: none">• Given your job roles and responsibility, kindly explain the key knowledge management strategies in the context of smart and sustainable strategies currently being implemented in your organisation.	
<ul style="list-style-type: none">• Given your role in this organisation, please explain me the challenges your organisation face in implementing smart and sustainable strategies.	
<ul style="list-style-type: none">• In your view is there a need for developing “an innovative business models for smart and sustainable strategies implementation for the benefit of Qatar organisations”.	

Thank you for your views on the above questions. I would also like to thank you for the time you have dedicated to this research. If you are interested to know the outcome of this research, it would be my pleasure to share it with you.

APPENDIX B: CONSENT FORM

ADOPTION OF SMART AND SUSTAINABLE STRATEGIES IN THE STATE OF QATAR

Consent Statement

- I agree to participate in the above research project and give my consent freely.
- I understand that the project will be conducted as described in the “Information Sheet”, a copy of which I have retained.
- I understand that I can withdraw from the project at any time and do not have to give a reason for withdrawing.
- I consent to participate in an interview with the researcher.
- I understand that my personal information will remain confidential to the researcher.
- I understand that my organisation will not be identified either directly or indirectly.
- I have had the opportunity to have questions answered to my satisfaction.

Print Name: _____

Signature: _____ Date: _____

Contact Address:

Phone Number: _____

Fax Number: _____

Email Address: _____

APPENDIX C: DETAILS OF ORGANISATIONS THAT PARTICIPATED IN THE SEMI-STRUCTURED INTERVIEWS

A break-down of professionals who were interviewed for the study

Responsibility of interviewee in the organisation	No. of Interviewees
Directors	
• Directors for sustainability project	6
• Directors for smart and sustainable cities	5
• Directors of technology	3
• Directors for human resources management	4
• Directors for transport, water and energy	6
Advisors	
• Sustainability project advisors	7
• Sustainable development policy advisors	6
• Smart technology advisors	2
• Smart cities advisors	5
Managers	
• Sustainability project managers	3
• Smart cities project manager	4
• Human resources manager	3
• Smart technology manager	2
Total	56

APPENDIX D: PROTOCOL FOR VALIDATION OF INNOVATIVE BUSINESS MODEL

Dear Sir/Madam

Re: An innovative business model for smart and sustainable strategies implementation

I am a PhD student at the University of Wolverhampton, U.K. and currently conducting an interview to validate a business model titled as above. The overall aim of this research is to investigate how Qatar public sector organisations are embedding smart and sustainable strategies in order to achieve the Qatar National Vision 2030. This research investigates the key smart and sustainable strategies, key reasons, challenges and the role which knowledge, experience and lessons learned plays in implementing smart and sustainable strategies. The results of the study will benefit public sector organisations through improved awareness and understanding of the key reasons for implementing smart and sustainable strategies and the key challenges organisations face in implementing smart and sustainable strategies.

This discussion aims to gather your responses which will help the researcher to validate an innovative business model for smart and sustainable strategies implementation for the benefit of Qatar organisations. This cannot be effectively developed without your participation; therefore, you are requested to participate in this research discussion. This discussion is estimated to take about 15 minutes.

In order to protect your confidentiality, privacy, dignity and anonymity, your answers will be attached with a unique code that will only be understood and accessed by the researcher. This will be stored in a password-protected computer that only the researcher has access to. Finally, any data provided by you will be destroyed once the degree is achieved. The project has ethical approval for the study protocol from the University of Wolverhampton, which provides further assurance.

If you have further questions about your participation, please contact me or my supervisor using the details below.

Thank you in advance for your help in conducting this research and I am looking forward to seeing you at the evaluation interview.

With best regards

Hamda Al-Meraikhi
University of Wolverhampton
Wulfruna Street, Wolverhampton.
England, WV1 1LY

An innovative business model for smart and sustainable strategies implementation

Purpose of the interviews:

The interview seeks to validate the developed business model for smart and sustainable strategies implementation.

Respondent details:

- Name:
- Background:.....
- Position / Area of expertise:
- Organisation:
- Date:

Evaluation of the proposed business model:

1. What is your opinion on the level of completeness in terms of the overall contents of the proposed business model?
2. What is your opinion on the level of completeness in terms of the logic (i.e. flow/ sequence within the business model and how it mirrors what should be done) used within the proposed business model?
3. What is your opinion on the issues covered within the developed business model?
4. What is your opinion on the level of understanding of the proposed business model?
5. Do you have further comments/suggestions regarding any areas that need to be improved/included/deleted within the proposed business model?
6. Would you recommend the innovative business model for smart and sustainable strategies implementation for use by Qatar public sector organisations?