T.C.
ISTANBUL AYDIN UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES

SMART CITIES, SMARTER MANAGEMENT
DEVELOPING A SMART FRAMEWORK FOR SMART CITY PROJECTS MANAGEMENT IN EUROPE

MBA THESIS

Tara ALSHAHADEH

Department of Business
Business Management Program

Thesis Advisor: Prof. Dr. Akın MARŞAP

June, 2018

T.C.
ISTANBUL AYDIN UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES

SMART CITIES, SMARTER MANAGEMENT
DEVELOPING A SMART FRAMEWORK FOR SMART CITY PROJECTS MANAGEMENT IN EUROPE

MBA THESIS

Tara ALSHAHADEH
(Y1612.130067)

Department of Business
Business Management Program

Thesis Advisor: Prof. Dr. Akın MARŞAP

June, 2018

T.C.
İSTANBUL AYDIN ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜ

Yüksek Lisans Tez Onay Belgesi

Enstitümüz İşletme İngilizce Ana Bilim Dalı İşletme Yönetimi İngilizce Tezli Yüksek Lisans Programı **Y1612.130067** numaralı öğrencisi **Tara ALSHAHADEH**'e **"SMART CITIES, SMARTER MANAGEMENT DEVELOPING A SMART FRAMEWORK FOR SMART CITY PROJECTS MANAGEMENT IN EUROPE"** adlı tez çalışması Enstitümüz Yönetim Kurulunun 08.06.2018 tarih ve 2018/17 sayılı kararıyla oluşturulan jüri tarafından oybirliği ile Tezli Yüksek Lisans tezi olarak kabul edilmiştir.

Öğretim Üyesi Adı Soyadı	**İmzası**

Tez Savunma Tarihi : 26/06/2018 – 15:00

1)Tez Danışmanı: Prof. Dr. Akın MARŞAP ....

2) Jüri Üyesi : Doç. Dr. Zelha ALTINKAYA ....

3) Jüri Üyesi : Dr. Öğr. Üyesi Farıd HUSEYNOV ....

Not: Öğrencinin Tez savunmasında **Başarılı** olması halinde bu form **imzalanacaktır**. Aksi halde geçersizdir.

DECLARATION

I hereby declare that all information in this thesis document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results, which are not original to this thesis. (01/06 /2017).

Tara ALSHAHADEH

FOREWORD

This thesis was written for my master's degree in Business Administration at Aydin University in Istanbul-Turkey.

Since August 2017, I have been conducting my research on the topic of Smart Cities Projects Management. I have experienced this period as very interesting, instructive, inspirational and extremely rewarded.

First and foremost, I would like to express my profound gratitude to my advisor Prof. Akın Marşap for his continuous support of my Master study and research, for his patience, motivation, enthusiasm, inspiration and immense knowledge. He consistently allowed this thesis to be my own work but steered me in the right direction whenever he thought I needed it. I could not have imagined having a better advisor and mentor for my research study.

I owe my deep gratitude to all my professors from Business Administration Department at Aydin University. During these two Master years, you inspired me in different ways and made it possible to achieve my goals and aspire to make a difference.

I wish to extend my thanks to all of the survey respondents, without their passionate participation, cooperation and input, the validation survey could not have been successfully conducted.

I'm immensely indebted to my second family at work, for providing me with unfailing support through the process of researching and writing this thesis.

I also place on record, my sense of gratitude to my friends scattered around the world, thank you for your thoughts, well-wishes, listening, offering me advice and being there whenever I needed a friend. To my dear students, thank you for inspiring me every day.

Finally, I must express my very sincere gratitude to my family; my most important person in the world; my mom, Randa Wanly, and to my aunt and uncle for their continuous encouragement and support throughout my years of study and for keeping me harmonious and motivated. This accomplishment would not have been possible without them. I will be grateful forever for your love. Thank you.

June, 2018 **Tara ALSHAHADEH**

TABLE OF CONTENTS

Page

ABBREVIATIONS

ASCIMER	: Assessing Smart City Initiatives for the Mediterranean Region
BSI	: British Standards Institute
CAGR	: Compound Annual Growth Rate
COP21	: 2015 United Nations Climate Change Conference
EU	: European Union
GDP	: Gross Domestic Product
IC	: Intellectual Capital
ICT	: Information Communication Technology
IGLUS	: Innovative Governance of large Urban Systems
IOM	: International Organization for Migration
IoT	: Internet of Things
IT	: Information Technology
KPI	: Key Performance indicator
NGO	: Non-Governmental Organization
PMBOK	: Project Management Institute Body of Knowledge
PMI	: Project Management Institute
PPP	: Public Private Partnership
R&D	: Research and Development
SC	: Smart City
SSC	: Smart Sustainable City
SSP	: Smart Success Practices
TBL	: Triple Bottom Line
U-city	: Ubiquitous city

LIST OF TABLES

Page

LIST OF FIGURES

Page

AKILLI ŞEHİRLER, DAHA AKILLI YÖNETİM AVRUPA'DAKİ AKILLI ŞEHİR PROJELERİ YÖNETİMİ İÇİN AKILLI BİR ÇERÇEVE GELİŞTİRME

ÖZET

Akıllı şehirler kavramı, özellikle Avrupa'da şu anda kentsel gelişimdeki “en sıcak konulardan” biri olarak kabul edilmektedir. Dünya genelindeki şehirler, teknolojinin ve altyapının entegre edilmesiyle, şehirlerin yaşanabilirliğinin, sürdürülebilirliğinin, hizmetlerinin ve rekabet gücünün artırılabileceği inancını yansıtarak akıllı şehir projelerini destekliyor ve teşvik ediyor. Konuyla ilgili birçok araştırma yapılmış olsa da yönetimsel açıdan hala sınırlı içgörü bulunmaktadır. Bu tez araştırması, akıllı şehir projelerine daha derin bir anlayış geliştirmek için akıllı şehri, bir yönetim objektifinden keşfederek bu boşluğu doldurmak için ele alınmıştır. Ayrıca, akıllı şehri eşsiz bir karmaşık proje şeklinde görerek ve akıllı şehir projeleri başarı uygulamalarını ve zorluklarını tanımlayarak akıllı şehir projesi başarısındaki akıllı yönetimin rolüne daha fazla odaklanmaktadır. Nicel bir korelasyon çalışması ile tez, akıllı proje yönetimi uygulamaları ile akıllı şehir projesi başarısı arasındaki ilişkiyi Avrupa'da bulunan farklı akıllı şehir projelerinde araştırmaktadır. Analize dayanarak, akıllı şehir projeleri yönetiminin bütünsel bir görünümünü ortaya koyan kavramsal bir çerçeve önerilmiştir.

Anahtar Kelimeler: *Marka yönetimi, Marka Tanıtımı, marka konumlandırması , moda , iletişim, Sosyal medya pazarlamacılığı, verimlilik, dijital pazarlama.*

SMART CITIES, SMARTER MANAGEMENT DEVELOPING A SMART FRAMEWORK FOR SMART CITY PROJECTS MANAGEMENT IN EUROPE

ABSTRACT

The smart cities concept is currently considered one of the “hottest topics” in urban development, especially in Europe. Cities around the globe have been promoting and supporting smart city projects, reflecting the belief that integrating technology and infrastructure can enhance cities’ livability, sustainability, services and competitiveness. Though a lot of research on the topic has been done, there are still limited insights into the managerial angle. This thesis research is thus undertaken to fill this gap by exploring the smart city through a lens of management in order to develop a deeper understanding of smart city projects. Also, it focuses more on the role of smart management in the smart city project success by viewing the smart city as a unique complex project and identifying smart city projects success practices and challenges. Through a quantitative correlational study, the thesis investigates the relationship between smart project management practices and smart city project success in different smart city projects located in Europe. Based on the analysis, a conceptual framework was proposed setting out a holistic view of smart city projects management.

Keywords: *Smart cities, Management, Project management, Smart success practices, Smart success criteria, Conceptual framework.*

1. INTRODUCTION

In recent years, the world has faced some of the most serious economic, environmental, social and technological issues. Since cities are a focal point for these profound issues; smart city concept has emerged to represent the opportunities and challenges facing cities as they respond to these changes and the problems generated by the urban population growth and rapid urbanization. Through the smart city concept, cities utilize ICT in order to increase the efficiency of urban infrastructure, decrease energy consumption and pollution, develop new services and improve the quality of life for citizens. Accordingly, city governments, technology and service providers all over the world have set their new focus on adopting the smart city concept and implementing smart city projects.

Creating smarter cities is very attractive for a city, however, it can be a critical task for assorted reasons. First, the Smart City (SC) concept is still blurred, and it intersects with multidisciplinary areas. Second, strategies to implement and manage SC projects vary among cities not to mention that organizational and managerial research for the smart city is scarce.

Consequently, this research study views the smart city as a unique complex project and focus on the management functions in pursuance of developing a deeper understanding for smart city projects and figuring how smart projects practices can be improved in order to avoid these projects failure and inefficiency through the implementing process.

This chapter introduces the topic of Smart Cities, the field of study for this thesis. After a brief introduction to the Smart City concept, the purpose and the problem statement of this study are stated. Subsequently, research questions which this study will try to answer and limitations with addressing these questions are presented. In addition, the importance of this study, reasons for taking on this study and expected results are covered in this chapter. Finally, the chapter ends up with a short reader's guide to outline the structure of this thesis.

1.1 Background of the Study

The smart cities concept is currently considered one of the "hottest topics" in urban development, especially in Europe. Cities around the globe have been promoting and supporting smart city projects, reflecting the belief that integrating technology and infrastructure can enhance cities livability, sustainability, services and competitiveness (Woods et al., 2016). More than ever before, technology companies realized the big and growing market of smart cities and acted accordingly. According to the latest update of the Navigant Research report, first published in 2013, 250 smart city projects globally in more than 178 cities around the world have been identified with the majority focusing on government and energy initiatives, followed by transport, buildings and water goals. Moreover, smart cities are foreseen to create tremendous business opportunities with a $1.5 trillion market value by 2020 (Frost & Sullivan, 2014).

The process of implementing smart city projects requires interaction and collaboration among different actors and stakeholders, from private and public sectors and citizens as well. Moreover, the presence of appropriate technological and human factors is not sufficient to guarantee the success of smart city projects (Capra, 2016). In short, smart city projects demand management competencies. Additionally, previous research works have indicated a poor focus on the managerial aspects of smart cities (Chourabi et al. 2012; Dameri&Ricciardi, 2014; Albino et al., 2015; Dewalska–Opitek, 2014). In fact, during the past few years, smart city research has been developed mostly in architecture and social sciences arenas as well as in engineering and computer sciences, whereas it has been poorly the focus of managerial debates (Dameri&Ricciardi, 2014). Therefore, further research on smart city projects management is required to identify the main problem areas and adopt the successful practices and activities so projects overall performance is improved.

Accordingly, this thesis research is undertaken to fill this gap, by exploring the smart city through a lens of management and examining the role of smart project management on smart city project success. Thereupon, the thesis will identify smart city projects success factors, analyze and assess the effects of smart project management practices on project success in Europe which that data was collected from. Finally, this thesis will recommend the essential smart management functions, activities and establish a framework for smart practices to improve the implementation of smart city projects in Europe.

1.2 Problem Statement

As it has been mentioned in the previous section, developing smart city projects sounds really attractive for a city, yet it can bring a lot of challenges to their development and many projects die after the pilot stage and never scale up (Winden, 2016). These challenges have heightened interest in the Smart City concept by a wide range of stakeholders. Cities in Europe are appointing 'Smart Urban Labs' for innovative and experimental Smart city projects where new ways of working, collaborating and networking are put into place, to improve the process of implementation. However, Smart City implementation is still obstructed, and more than two-thirds of smart city projects remain in the planning or pilot phase (Hartemink, 2016; Manville et al., 2014).

Due to the cities' complexity, many factors such as human, technological, institutional, etc. make smart city initiatives ineffective (Hartemink, 2016). One of the crucial factors that lead to the failure of smart city projects is the managerial and organizational challenges (Chourabi et al., 2012). And even though many researchers tend to spotlight the technological sides of the smart city, its organization and policy issues have not gained much attention (Nam & Pardo, 2011b).

Thus, there are still limited insights on the barriers and the success factors for effective and efficient management of smart city projects and how can the appropriate practices affect or contribute to the success of smart city projects. Moreover, there is a lack of an integrated smart framework for smart city projects management in different contexts.

1.3 Research Objectives

Smart city projects and research are aimed at the sustainability, resilience, quality of life and competitiveness of city systems (Rogerson, 1999; Chourabi et al., 2012).

Each smart city project poses big challenges to the people and organizations that directly or indirectly govern, plan, modify and manage it, thus in order to tackle these challenges successfully smart cities projects require an appropriate management approach which will be the main focus of this thesis.

This thesis aims to define the boundaries of smart cities research from a managerial angle and to fill some of the research gaps by analyzing the relevant literature to identify common and different management characteristics in smart cities projects and highlight the success factors and challenges smart cities projects managers may face. Also, it proposes a conceptual framework setting out a holistic view of smart city projects management. Moreover, through a quantitative correlational study, it investigates the relationship between smart project management practices and smart city project success in different smart city projects located in Europe. To illustrate, this study sets the following objectives:

- Define core concepts in this thesis (Smart City, Smart city frameworks and benchmarking) and develop a better understanding of smart city projects from a managerial point of view.
- Identify the main challenges and factors that affect smart city projects management.
- Analyze the impact of smart project practices on project success.
- Analyze the impact of smart city project size and context on the relationship between smart practices and project success.
- Establish an integrated smart framework which could be adapted to managing the smart city projects in Europe.

1.4 Research Questions and Hypotheses

The main research questions guiding this study are identified as follows:

RQ1: How to run smart city projects efficiently and effectively in Europe?

RQ2: How do smart project management practices influence the project success in Europe?

In order to answer the main research questions, the following sub-research questions are addressed in this study:

SRQ1: What are the available frameworks for smart city projects management?

SRQ2: What are the main challenges facing smart city projects?

SRQ3: What are the success factors that lead to successful implementation of smart city projects?

Research Hypothesis:

- There is a statistically significant positive relationship between project smart practices and project success.
- The impact of smart practices on project success is moderated by project size and project context.

Research Hypotheses will be discussed in detail in chapter 3.

In order to answer the main research questions, all of the sub-questions were addressed firstly by considering the literature review of previous research. The reason sub-questions were raised is to gain knowledge about the study concept and to have a clear idea and perspective to answer the main questions. On the other hand, main questions were answered by both, the theoretical and empirical study. Accordingly, a theoretical framework was developed based on the literature findings and the result of the questionnaire gave the opportunity to adapt the study into the practical application. Thus, the hypotheses which were constituted in the theoretical stage of the research can be accepted or rejected. All the research questions will be completely explained and answered in analysis and results chapters.

1.5 Research Methodology

To achieve the objective of the thesis, the following methodologies were used. First, a thorough literature review was conducted regarding the concept of the smart city, smart city frameworks, smart city projects critical success factors and challenges in the smart city projects development process. Following literature reviews, a conceptual framework was developed according to the findings from the literature and a quantitative design was chosen to investigate the relationship between smart management practices in different project's life-cycle and project success. Finally, primary and secondary data were collected using a well-structured questionnaire and review of previous research works.

The study utilized survey questionnaires for assessing the relationship between smart management practices and project success criteria of the selected cities in Europe. This questionnaire was distributed to project managers and professionals who work in smart city projects in Europe.

1.6 Significance of the Study

This research hopes to contribute at two levels. First, at a scholarly level, since there are few studies in the area of smart city project management, it will add value to the current body of knowledge, link the project management functions with the smart city concept and give a novel direction for more studies in this area. Second, at a practical level, where the study findings may indicate a positive correlation between smart project management practices and project success. Thus, some parties which are involved in the smart city projects may wish to adopt these smart project management practices into their daily management of projects in an attempt to increase the project efficiency and effectiveness.

1.7 Scope and Limitations

This research will focus on the management of smart city projects. The main concentration will be on the smart project management practices such as smart planning, smart organizing, smart leading and smart controlling and how they influence smart city projects success in terms of time, cost, sustainability, quality and the created value.

Moreover, the thesis will focus on smart city projects across multiple domains in Europe. In this research “Europe” includes the 28-member countries in the European Union (EU) as the following: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Spain, Slovakia, Slovenia, Sweden and the United Kingdom.

This thesis will not include detailed technical analysis of Smart City projects and Smart City developments in other parts of the world, other than Europe.

Furthermore, the findings of this study are limited to project professionals of the European smart city projects such as project managers, IT engineers, developers, and etc.who agreed to participate in the study. Thus, the generalization that arise from the research has to be limited to the context of Europe.

1.8 Summary and Organization of the Study

During recent years, smart city concept has attracted the attention of academicians, businesses and governments all around the globe. What makes smart cities unique is the use of innovation and technology to address the needs of communities and to increase cities efficiency, sustainability, competitiveness and quality of life.

This research examined the relationships among smart city projects practices and project success. What’s more, the impact of project size and context was observed as a potential moderating variable in the relationships.

This thesis is subdivided into five chapters. First, chapter 1 presents an introduction to the study, problem statement, research objectives, research questions, assumptions scope and limitations and the significance of the study. Hereafter, a literature review selected from relevant journals, books and publications including the latest studies on smart city concepts is presented in chapter 2. Included in chapter 3 is a description of the research methodology including the research method, hypotheses, sampling, survey instruments and data collection and analysis processes. The data analysis and interpretation are addressed in chapter 4. Finally, discussion of the findings, a comparison to the theoretical section, study implications, recommendations for action and further research and conclusions drawn from the study are provided in chapter 5.

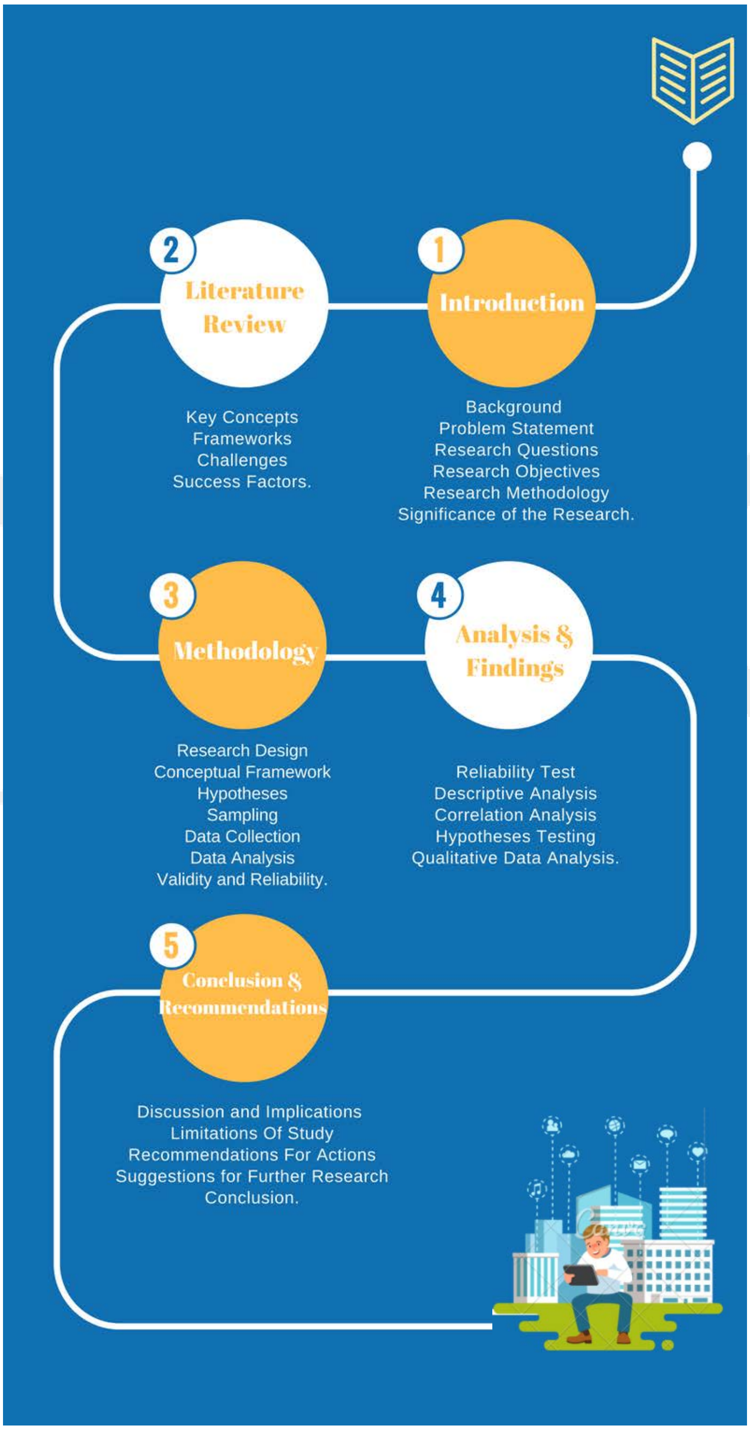


Figure 1.1: Structure of the Thesis

2. LITERATURE REVIEW

2.1 Introduction

The main focus of this chapter is to gather the body of knowledge necessary for this research in order to establish basic definitions that will foster an understanding of this study, develop a theoretical background for the subsequent analysis and link and evaluate the findings of available researchers to create an updated framework that can be useful in Smart City projects management.

It will start with information regarding general Smart City concepts and the conditions for the rise of the smart city and its importance, before introducing the available frameworks for smart city analysis and benchmarking, followed by identifying the smart city projects challenges then highlighting the success and failure factors that affect Smart City projects management.

Literature review presented most papers and publications on this subject focusing on either governance, management side or on the technological one, however only very few publications which considered the project management angle were found.

2.2 Smart City: Concept and Definition

2.2.1 Smart City definition

The “Smart city” is a simple label for the complex forces shaping urban life in the 21st century. Even though miscellaneous efforts have been made to academically identify the smart city there is no universally accepted definition of it and the term is still fuzzy, as it means different things to different people with no unified concept or a single template of framing the smart city.

The conceptualization of smart city, therefore, varies from city to city, depending on the level of development, ability and willingness to change, resources and the citizen’s aspirations (Bhavsar et al. 2016).

There are plentiful definitions for the smart city and its essence. However, most authors emphasize on the infrastructure as the central aspect of the smart city concept while Information and Communication Technology (ICT) is the key driver of the evolution of cities coupled with social, environmental and human capital development. (Monzon 2015, Borcuch 2016)

The term “Smart city” was first used in the 1990’s where it only focused on the significance of new ICT regarding modern infrastructures within cities. Years later, the amount of publications referring to smart city has distinctly grown and started to associate with other aspects after it was too technically oriented especially with the emergence of smart city projects and endorsement by the European Union (Albino et al. 2015, Hajduk 2016)

Table 2.1 includes some definitions for the Smart city according to scholar’s conceptualization of smart city with alternative approaches.

Table 2.1: Smart city Definitions

Aspect	Definition	Source
Technology	“Smart city as a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality. ”	Bakici et al. (2012)
	“The use of smart computing technologies to use the critical infrastructure components and service of a city -which include city administration, education, healthcare, public safety, transportation and utilities- more intelligent, interconnected and efficient.”	Washbum et al. 2010
	Smart city indicates an “instrumented, interconnected and intelligent city “that optimize the use of limited resources.	Harisson et al. (2010)
Interrelationship between several aspects	“Being a Smart City means using all available technology and resources in an intelligent and coordinated manner to develop urban centers that are at once integrated, habitable, and sustainable.”	Barrionuevo et al. (2012)
	“A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.”	Caragliu et al. (2011)

Table 2.1: (con) Smart city Definitions

	"The application of information and communications technology (ICT) with their effects on human capital/education, social and relational capital, and environmental issues is often indicated by the notion of Smart City."	Lombardi et al. (2012)
	"A Smart City infuses information into its physical infrastructure to improve conveniences, facilitate mobility, add efficiencies, conserve energy, improve the quality of air and water, identify problems and fix them quickly, recover rapidly from disasters, collect data to make better decisions, deploy resources effectively, and share data to enable collaboration across entities and domains."	Nam and Pardo (2011)
	"A city well performing in a forward-looking way in economy, people, governance, mobility, environment & living, built on the smart combination of endowments and activities of self-decisive independent and aware citizens."	Giffinger (2007)
	"The Smart City uses the infrastructure network to improve economic and political efficiency and to allow social, cultural and urban development. "	Hollands (2008)

Washbum et al. (2010) and conceptualize Smart city by focusing on the technological aspect, where a smart city is a city that applies ICT to infrastructure and services.

For corporations, such as IBM, Siemens and Cisco, the technological component is also the main component to their conceptions of smart cities.

Innovative governance of large urban systems (IGLUS) explain how smart city operates in three main layers, the infrastructure layer that enables living and working together, the service layer offering services to citizens and customers and the "digital" or "data" layer that emerge from data generated from sensors, cameras, GPS, smartphones and others. The digital layer is what differentiates the smart city from traditional cities and gives a definition to it.

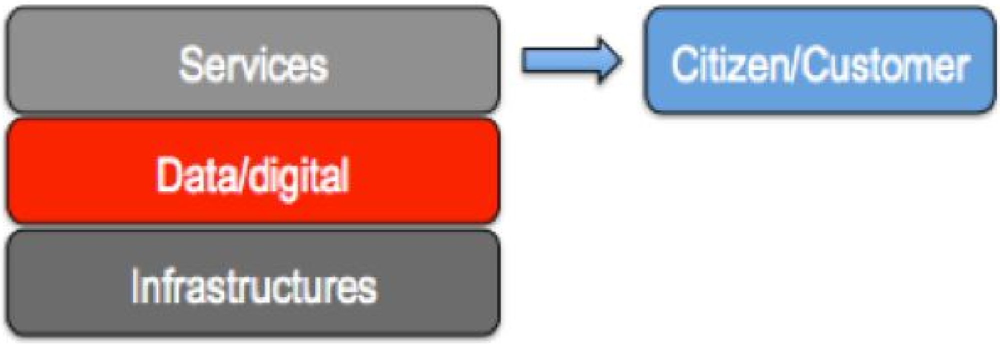


Figure 2.1: Smart City Concept Layers (IGLUS, n.d)

IBM's vision for the smart city has three main characteristics: "instrumented, interconnected and intelligent". Instrumentation refers to capturing real-time real-world data generated from physical and virtual sensors and source of this data. The combination of instrumented system and interconnected data across multiple processes, systems, organizations, industries, or value chains systems effectively connects the physical world to the virtual world. Intelligent is making better operational decisions by inclosing complex process (Harrison et al. 2010).

Other definitions, however, broaden the Smart city concept by linking technology with other Aspects such as Nam and Pardo (2011) who approached the "Smart city" by differentiating it from other related terms such intelligent, digital, information city etc. and linking it with technology, human and institutional factors.

Smart city definition is not only about the ICT infrastructure. Caragliu et al. (2011) and Giffinger et al. (2007) present less ICT inclusive definition for the Smart city and highlight the interrelationship among infrastructure, ICT, human capital, social capital and other factors.

Bhavsar et al. (2016) Conclude that the smart city has the following characteristics: Sustainable, Manageable, Affordable, Revolutionary and Transformable.

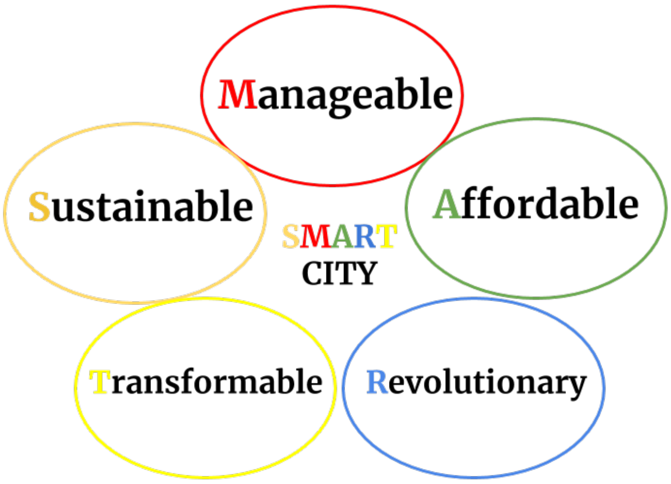


Figure 2.2: Smart City Concept Adopted from Bhavsar et al. (2016)

With the above-mentioned in mind, it can be inferred that the balanced combination of the technological, human and social factors implies an innovative approach that is more intelligent and efficient in the use of resources for achieving urban ecosystem development, sustainable economic growth and improved services that offer a better quality of life and environmental sustainability.

2.2.2 Smart City practices

Smart cities currently are the global megatrend of the 21st century. According to Grand View Research Inc. 2018 report, the global Smart City market size will reach a total market value of $2.57 trillion by 2025, at a CAGR of 18.4% during the forecasted period. Meanwhile, Mordor Intelligence LLP estimates that the global Smart City market size will grow from roughly $390 billion in 2014 to about $1.4 trillion in the year 2020, growing at a (CAGR) of 20.5% over the forecasted period. Frost and Sullivan and other consulting companies predict similar market size and growth rate.

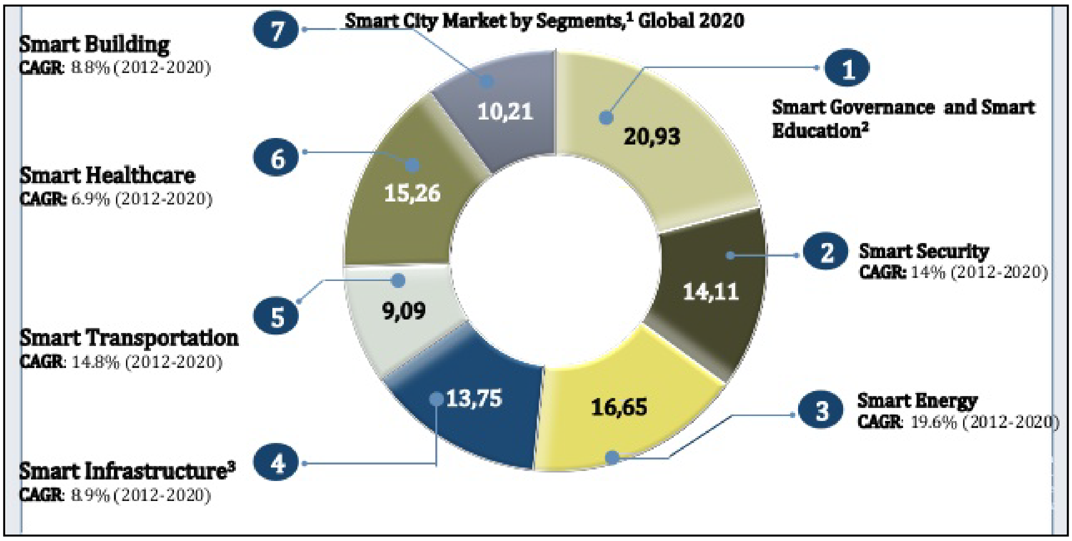


Figure 2.3: Smart City Market (Frost & Sullivan analysis, 2013)

City leaders and technology and service providers all over the world have set their new focus on adopting the smart city concept by laying-out smart city strategies, demanding for more data-driven policymaking, boosting innovative projects, making smart city development relevant to citizens and their lives and setting standards for driving smart city programs to the next level (Woods et al. 2016).

Because the parameters for “smart” selection vary, most practices are mainly project based and they do not represent the overall smartness of the city (Townsend 2013).

According to the report published in 2011 by ABI Research, a New York market research company, there are around 102 Smart city projects worldwide (Schelmetic, 2011). Still, for many cities the smart city is an evolving concept as more than 50% of Smart cities of 2025 will be from Europe and North America according to Frost&Sullivan report.

Cities like San Diego, San Francisco, and Amsterdam were among the frontrunner on smart cities, while other cities followed the practice like Southampton, Manchester, Vancouver and Montreal (Allwinkle & Cruickshank 2011).

The concept of smartness has become extremely popular in Europe and the term “Smart City” became part of the EU research funding to support the development of Smart cities throughout Europe (Veeckman & van der Graaf, 2014).

Amsterdam, Barcelona and Singapore are the leaders in developing broad strategies instituted and driving continuous innovation programs across many aspects of city life including energy efficiency, urban mobility, IoT etc., (Woods et al., 2016; Ponting 2013).

The Japanese Government created a “FutureCity” that is a good example of how technology can enable cities to manage energy efficiently for achieving environmental sustainability and better livability (Abdoullaev, 2011).

In China, smart cities have been included in their government planning agenda in six provinces and 51 cities (Liu & Peng 2014).

India is planning to use a mixture of public-private partnerships (80%) and publicly funded trunk infrastructure investment (20%) for developing seven smart cities along the Delhi-Mumbai Industrial Corridor (Abdoullaev, 2011).

In the Middle East, Dubai has established a smart city programme that has a strong emphasis on energy infrastructure as well as improvements in city services.

Also, reduction of gas emissions is another priority for many cities where around 80 city leaders at the COP21 conference in 2015 committed to the goal of reducing emissions at least 80% by 2050. Copenhagen has one of the most ambitious carbon reduction goals, with the city aiming to be carbon neutral by 2025 (Woods et al., 2016).

While many existing cities are retrofitted into smart ones, brand-new smart cities are also built from ground zero as Greenfield project, such as Songdo (South Korea) that developed the special economic zone (SEZ) model to deploy economic growth. (Lee et al., 2013; Tok et al., 2014).

Smart City offers many applications by implementing ICT systems in infrastructure and city services such as E-Government, smart building, smart healthcare, smart mobility, smart infrastructure, smart energy and smart citizen. IBM introduced a 10 pillars model for smart city applications which flourish from the combination of infrastructure, people and planning and management.

Figure 2.4: Smart City Applications (IBM, 2010)

For what is mentioned above Smart city development and marketing offers tremendous business opportunities besides the economic and environmental sustainability that increase effectiveness, reduce costs and improve quality of life.

2.2.3 Why become a Smart City

Cities across the globe are facing significant environmental and urbanization challenges besides other issues such as the ageing infrastructure, the growing global competition and the limited financial resources.

While global warming and climate change are dominant on policy agendas across all countries, there is a global challenge to reduce carbon footprint and our environmental impacts.

At the same time, according to the United Nations, the number of people living in cities will increase from 54% to 66% between 2010 and 2050, meaning that 70% of the global population will be urbanized by 2050 (Un.org, 2014). Not to forget the migration crisis with over than a million-migrant arrived in Europe only by 2015 (IOM, 2015).

This means that the need for clean water, electricity, homes, efficient transport and city services such as health, education and public safety will increase significantly.

The essence of smart city movement is to address these challenges and deliver better solutions by focusing on sustainability, innovative working life, citizen well-being and economic development.

Smart cities initiatives aim to improve city efficiency and implement infrastructure management and solutions that can lead to cost saving and increased revenues. Besides the economical aims and infrastructure modernization, moving towards more environmentally friendly direction; “become greener “is another reason to engage in smart city projects. Furthermore, Smart city projects create a high-quality living and that boost a positive relationship between the city and its citizens. Also, when cities use “Smart” term, it becomes more attractive to both citizens and businesses which enhance the city marketing (Woods et al., 2016).

Neirotti presents the value creation in the Smart city for each citizen, public and private sectors. First, cost and time savings in energy, transportations, etc. increase citizen’s productivity and empower them. Second, Smart cities create a new market and new revenue opportunities for firms. Lastly, economic development (growth of GDP, employment, exports, foreign direct investment), quality of life, environmental and social sustainability, and less negative externalities are the created value for the public sector and city (Neirotti, 2013).

Most of the researchers agree that Smart cities are the key for the sustainable transformation of cities and technology can be adapted to citizen’s needs which lead to empowering citizens (Cugurullo, 2013; Kitchin, 2014; Vanolo, 2014). However, some authors criticize smart city and its possible risks such as Dameri &Rosenthal-Sabroux (2014) and Hollands (2008) who argue that studies neglect the effects of technology on smart city citizen’s daily life, besides the lack of support for planning and implementing smart city projects.

Townsend (2013) and Murray et al. (2011) argue that among the most pressing challenges are future cyber-attacks, privacy and data security that face Internet of Things -driven smart cities– implying that technology is also known for its unpredictability or ability to crash often referred as the “blue screen of death” in technical reference or “brittle and buggy”.

Abdoullaev (2011) states that well-established culture of knowledge, innovation, learning and partnership must exist between the components of the city in order to reach the full potential of the smart city.

Other authors such as Gleeson et al. (2000) and Hollands (2008) question whether sustainability and economic growth in smart cities are actually compatible and are not in conflict with each other.

Caragliu et al. (2011) find that concentrating on smart city concept might underestimate the negative effects of ICT infrastructure development used for becoming a smart city. Furthermore, the lack or the non-availability of data necessary for measuring the value created in smart cities initiatives created (Dameri & Rosenthal-Sabroux, 2014). Also, since many smart city projects remain in the planning or pilot phase there is no benchmarking or reliable evidence of the impact of these projects (Manville et al., 2014).

With the major pressing challenges facing cities today, the need for transforming into a smart city is rising especially with the leverage of big data and IoT. That’s why moving towards a smart city is a continuous sustainable process which can help creating innovative solutions according to city needs and promoting urban sustainability that makes cities more efficient, intelligent and collaborative.

2.2.4 Smart City participants

Smart city projects include many different partners and stakeholders that engage together and play different roles to create a smart city.

Leydesdorff&Deakin (2011) introduce the triple-helix model that defines the main three actors in the smart city which are government, industry and universities. Other researchers such as Lombardi et al. (2012) and Aoun (2013) include other actors in the smart city who are citizens as the main actor also, NGOs, utilities, investors, planners and developers who collaborate to achieve smart city projects. Each stakeholder plays a key role in delivering the vision of the smart city. For instance, governments set policies, provide funds and bring other stakeholders together in innovation programs where city administration and associations act as regulators, set benchmarking and collaboration mechanisms, and engage citizens in smart city projects. Also, investors and financial institutions provide funding to smart city projects where academia provides R&D and knowledge that supports smart city projects. Moreover, industry including private or public sectors and utilities are operators, developers and owners which create solutions, new business models and boost innovation. Finally, citizens and communities provide ideas and feedbacks and engage with city services (The European Commission 2013).

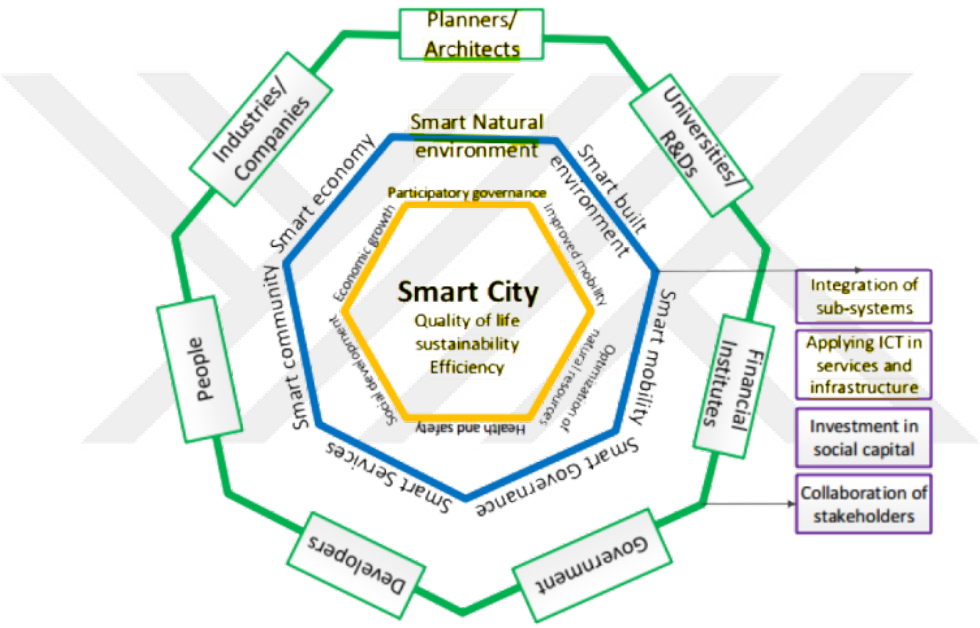


Figure 2.5: Smart City Participants (Hartemink, 2016)

2.2.5 Smart City components

According to Nam and Pardo (2011), there are three components of the smart city. The first one is the technological component (software and hardware infrastructure) which is the existence of urban information and communication technology infrastructure. For technology giant companies such as IBM, Cisco Systems, Siemens AG, General Electric, Microsoft, Google etc. the technological component is the key component to their conceptual framework of smart cities (Albino et al. 2015; Townsend 2013). Even though the technological component is considered fundamental to become a smart city, yet it is not sufficient without the collaboration and coordination with public and private sectors, NGOs, educational institutions and citizens (Lindskog 2004).

Second; human component (human infrastructure and social capital) as the key elements such as creativity, education, learning and knowledge that have central roles in the smart city (Thuzar, 2011). Smart people have a dynamic role in the city development and economic growth where they benefit from the network of relationships among each other (the social capital of a city) when sharing different experiences and exchanging knowledge. This mix of education/training, culture/arts, and business/commerce with hybrid social, cultural and economic enterprises create the meaning of smart city concept (Campbell, 2012; Winters, 2011).

Third; Institutional component (governance, policy and regulations) that is necessary to support and facilitate the implementation of smart city projects by using technology and human capital in order to innovate and achieve the city development (Nam &Pardo 2011).

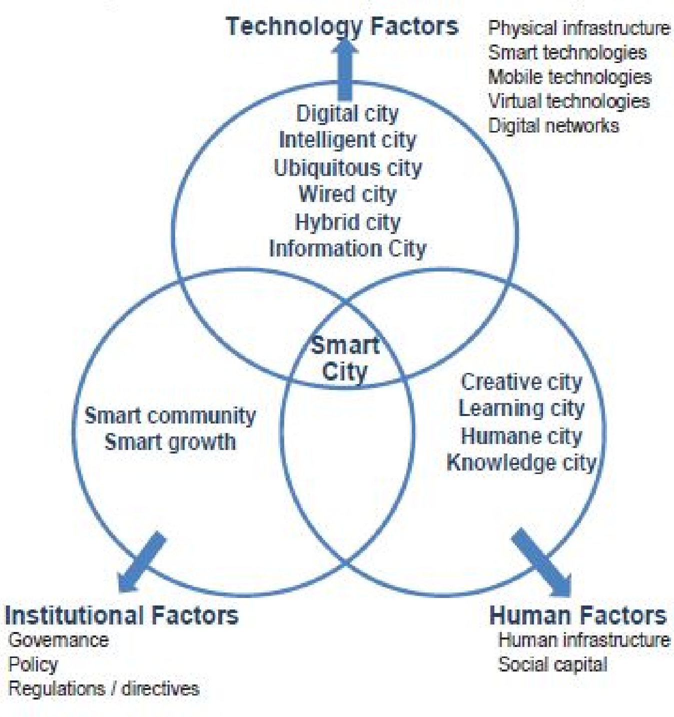


Figure 2.6: Components of Smart city (Nam&Pardo, 2011)

Many concepts that were developed through various phases are related to smart city and at the same time are connected to its components. To begin with, the raising up of the intelligence with a wide range of electronic and digital technologies creates the core aspect of technological oriented smart cities, such digital, intelligent, ubiquitous, wired, hybrid and information city (Albino et al. 2015).

The term “digital city” was firstly used in 1994, the Netherlands in a period that witnessed a huge growth in the use of internet and public media (Becker et al. 2011; Kogan&Lee 2014). Ishida (2002) defines the digital city as a “connected community that combines broadband communications infrastructure to meet the needs of governments, citizens, and businesses” which means the digital city creates a space for collaboration and information sharing anywhere in the city.

On the other hand, when technology used to support learning and innovation to achieve a better quality of life, city emerge to be an “intelligent city” and that’s what differentiates it from the digital city. Still, there is no human component included in contrast to the smart city (Nam &Pardo 2011; Woods 2013).

A Ubiquitous city or U-city came as a result of merging information and social systems, where citizens virtually can get any service anytime anywhere through any device (Lee et al., 2013).

In the hybrid city which is the combination of traditional real city and a parallel virtual city of counterparts of real entities and people, the goal is to create a city that works in harmony between the urban fabric and its cosmopolitan inhabitants (Streitz, 2009).

Last, information city is a “digital environments collecting official and unofficial information from local communities and delivering it to the public via web portals” (Anthopoulos et al. 2010).

As noted previously, the human component is missing and because of this, other concepts have emerged and were associated with the smart city concept. First, a smart city is a creative city which is a combination between hard infrastructure (roads, bridges, etc.) and soft infrastructure (human capital and institutions) that cultivate creativity among its citizens and provide emotionally satisfying places and experiences for them (Yencken, 1988). In addition, a smart city is learning city that promotes lifelong learning for all and enhances social and economic development (Plumb et al. 2007). Similarly, a smart city is a humane city that utilizes its people potentials to achieve a creative life.

Moreover, a smart city is also a knowledge city that is related to the knowledge economy and the information society with its main objective is to promote science, innovation and knowledge sharing. Its applications are reflected in government services, economy and society (Radovanović, 2003).

Another perspective for the smart city is the smart community where members and institutions work in partnership and use ICT technology in order to innovate and solve their social and business needs (Berardi, 2013). This smart community promotes a smart growth represented in urban planning, sustainable development, environmental protection and community engagement.

While smart cities are now at the center of the revolution of city life, the future smart city will be developed with artificial intelligence technique that will be upgraded to have emotions like a human being and ICT to be developed into soft and warm technology (Shin, 2012).

In summary, Smart city is the latest trend in urbanization and digital development where the main role is for ICT infrastructure (as a tool for innovation); however, the human (that manage innovation) and institutional (that enable innovation) components are crucial and essential drivers for the smart city success.

2.2.6 Smart City dimensions

The smart city dimensions are linked to traditional development and growth theories such as transport, economics, natural resources, quality of life and partnership. One of the most quoted frameworks was developed as a ranking tool for evaluating mid-sized European smart cities by European Cities Project defines 6 main dimensions in the areas of the economy, people, governance, mobility, environment and living (Giffinger et al., 2007).

The technology, human and institutional components influence and result in a variety of combinations for smart city characteristics.

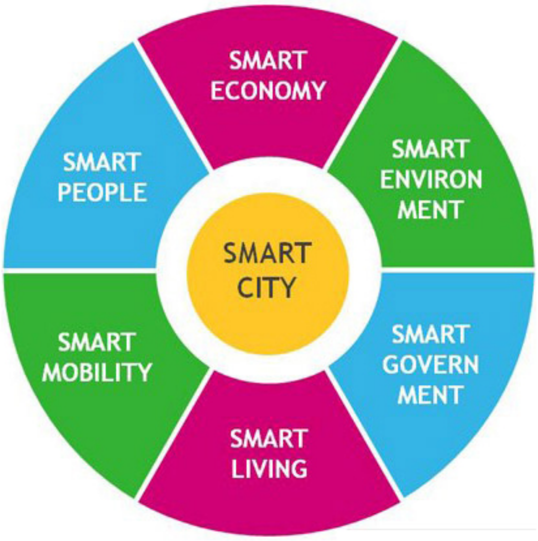


Figure 2.7: Smart City Dimensions (Giffinger et al., 2007)

2.2.6.1 Smart economy

One of the core smart city objectives is to build a sustainable economic growth and business development (Kehoe et al., 2011). Smart economy is linked to a range of factors such as the flexibility of the labor market, innovation, entrepreneurship, productivity and international connectivity, in addition to activating the role of scientific research and development (R&D) and technologies in raising the economic level and competitiveness (e.g. E-business and E-commerce) (Giffinger et al., 2007).

2.2.6.2 Smart people

Creating a smart city requires a high level of education among individuals, a sufficient level of creativity, participating in lifelong learning, social interaction and cosmopolitanism (Giffinger et al., 2007). Smart city council (2014) includes citizens, policymakers, financiers, business managers, city planners and officials and PPP (Public-private partnerships) as the group of smart people.

2.2.6.3 Smart governance

Smart governance means developing efficient and interconnected government work system through technologies and providing government services for citizens through electronic channels (e.g. e-government). This means that local administrations and non-governmental organizations collaborate and cooperate to facilitate public and social services for citizen and allow participation in decision making (Giffinger et al., 2007).

2.2.6.4 Smart mobility

Smart mobility depends on connecting transport system with technologies in order to create innovative, safe and sustainable transport systems. Smart city seeks to increase efficiency, save time and costs and reduce CO2 emissions in transportation systems through the availability of ICT infrastructure and providing access to local and international transportation (Giffinger et al., 2007).

2.2.6.5 Smart Environment

The availability of a smart environment is linked to a combination of factors such as natural conditions of a city (climate, green areas, parks, etc.), sustainable resources management (energy, water, etc.) and environmental protection and pollution reduction (Giffinger et al., 2007). Many opportunities exist in the areas of city energy management like smart grids development and renewable resources to produce electricity. Other concepts like net zero concept or solar technologies have emerged by applying innovative energy technologies on existing buildings (Meeus et al., 2010).

2.2.6.6 Smart living

Smart living includes a range of events and activities that have the ultimate goal of enhancing the quality of life for citizens through "ICT enabled" lifestyles. Smart living emphasizes healthy and safe living, availability of cultural and educational facilities, as well as social cohesion and attractive touristic atmosphere (Giffinger et al.,2007). The smart city has introduced many services such as smart home, e-health, smart building services, etc.

Each of the above-mentioned components establishes the broad implications for smart cities, while the factors form guiding indicators that are used to measure and evaluate the overall smartness of the city.

2.3 Frameworks for Smart City Analysis and Benchmarking

Many researchers and organizations focus on developing frameworks for smart city analysis and benchmarking since it is an effective tool for understanding smart city concept, implementing smart city projects and measuring the performance of smart cities and its future development. Through this assessment, strengths and weaknesses can be identified and thus formulate development objectives and strategies.

2.3.1 Frameworks for smart city analysis

This section provides a detailed review of several important conceptual frameworks based on how the framework is integrated, comprehensive and relevant to the managerial aspects.

2.3.1.1 Smart city initiatives framework

Chourabi et al. (2012) developed an integrative framework based on a set of factors that influence each other and also the smart city initiatives and projects. These factors are organized into two layers according to the difference in their influence where the first layer has the most direct impact on the success of smart city initiatives. The first inner layer includes technology, management and organization and policy. The second outer layer contains governance, people and communities, economy, built infrastructure and finally the natural environment. The goal of this framework is to identify the factors that influence smart city implementation and to serve as a tool to understand the relative success of smart city initiatives in different contexts.

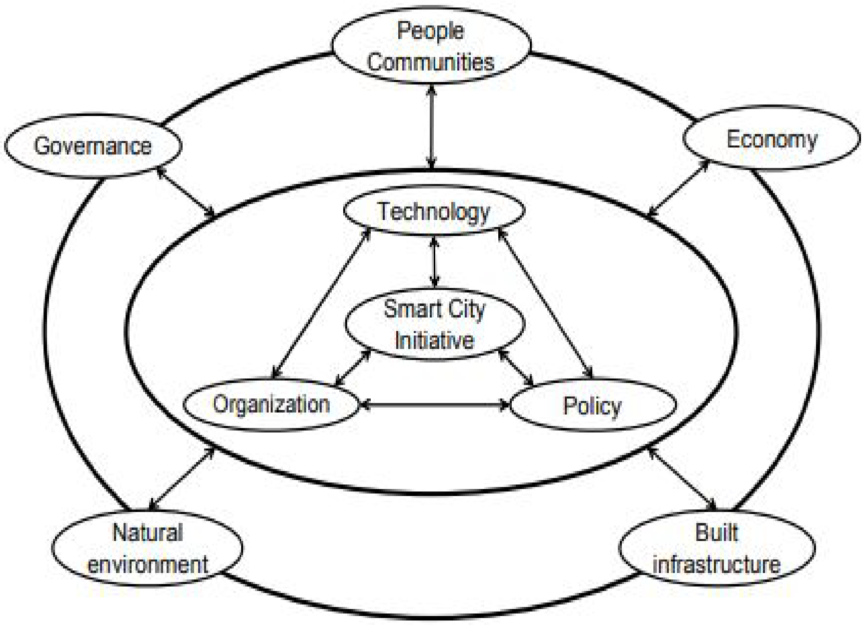


Figure 2.8: Smart city initiatives framework (Chourabi et al., 2012)

Focusing on the management and organization factors, Chourabi et al. (2012) study smart city in the context of IT projects and e-governments since there is no sufficient academic literature addresses issues from a managerial point of view.

Chourabi et al. (2012) adopt Gil-Garcia et al. (2005) e-government initiatives to specify success factors and challenges since both smart city and e-government initiatives share similar drivers like the government and ICT and differ in context and project's characteristics. To illustrate Gil-Garcia et al. (2005) list managerial and organizational challenges that might come across city managers such as project size which as a major issue from the management perspective, manager's behavior, conflicting or no clear project goals, multiple organizations and users, resistance to change and conflicts. Similarly, some of the managerial strategies to overcome the above-listed challenges are the skill and expertise of the project team especially the IT leader, planning and setting realistic clear goals, identification of relevant stakeholders, good communication, innovative funding, appropriate training, users involvement, practices review and business process improvement (Gil-Garcia et al., 2005).

2.3.1.2 The framework of smart city innovation

Nam and Pardo (2011) describe the smart city innovation from a perspective of four dimensions which are technology, organization, policy and context. While technology serves as a tool for innovation, organization role is to manage this innovation leading to the effective use of technology. Moreover, policies create suitable conditions for using technology in a smart way. Finally, the context of each city which is the physical dimension, environment and interaction levels. The unique context of each city requires a distinctive strategy.

The smart city core is the technological innovation; however, organizational and policy innovation is required in order to enable these technological potentials. Focusing on the organizational and management context; various strategies are available for smart city innovation. First, Enterprise Architecture that helps organizations to design systems and develop ways to achieve their future objectives effectively and changes the traditional bureaucracy by an IT infrastructure that supports business processes. Second, appropriate cross-organizational management to enable information and knowledge sharing within or across different organizations and governments which is essential for smart city innovation. Third, the leadership role that in this context extends to leading not only a team or a single enterprise but a network of organizations. This leadership role is crucial in the success of innovation and implementation of smart city initiatives (Nam and Pardo, 2011).

Table 2.2: The Framework of Smart City Innovation (Nam&Pardo, 2011)

Dimension	Innovation How can we change the way government delivers service?	Risk What are risks from innovation?	Way to Success How can we deal with risks while innovating?
Technology (to serve as a tool for innovation)	▪ Leveraging transformational potentials of advanced ICTs	▪ Lack of knowledge ▪ Incompatibility ▪ Too much hope ▪ Security	▪ System interoperability ▪ Integration of systems and infrastructures
Organization (to manage innovation)	▪ Enhancing efficient, effective management (front-office and back-office) ▪ Improving interoperability within or across organizational boundaries	▪ Organizational conflict ▪ Resistance to change ▪ Misalignment between goals and projects	▪ Enterprise interoperability and business modeling ▪ Cross-organizational management and managerial interoperability ▪ Leadership
Policy (to create an enabling environment)	▪ Redesigning relationships between government and actors ▪ Policy experiment	▪ Inconsideration of multiple stakeholders ▪ Political pressure ▪ Conflict with other policies	▪ Policy integration ▪ Marketing ▪ Governance ▪ Collaboration ▪ Partnership
Context	▪ Physical dimension ▪ Environment ▪ Level of interactions		▪ Consideration of context

2.3.1.3 Framework of Smart city analysis

Lee et al. (2013) developed a conceptual framework for smart city practices and implementation around the globe according to technological and institutional elements. Six key dimensions and 17 sub-dimensions of smart city practices are identified:

- The urban openness that is open innovative systems and collaborative environments where open participatory services and availability of open data platform drive open innovation networks.
- Service innovation whether it is service diversity or service integration which is the connectivity of different services for innovating in the same domain or cross-functional domains from a business model perspective.
- Partnership formation where smart city projects can be carried out by the government, private sector or cooperation between public and private sectors (PPP). Also, funding resources for developing projects whether with a bottom-up approach with the private sector direct contribution or a top-down approach which is governmental financing.
- Urban proactiveness where intelligent technology is embedded in smart city services and offering smart green services related to environment and energy sustainability.
- Infrastructure integration as in ICT infrastructure for supporting smart city initiatives.
- -Smart city governance that needs innovative governance models for effective governing among multiple stakeholders. Furthermore, the coordination among several institutions, public or private and citizens require a strong smart city leadership where centralized governance is recommended at an early stage of smart city development and decentralized one during the growth stage. Besides, smart city effective development needs a comprehensive strategy aligned with smart city initiatives and objectives. Along with solid leadership and clear strategy, it’s important to formulate smart city planning and development principles to be used by city’s organizations. However, the local organizational culture of

each city and how this culture endorses or refuses innovative services should be considered by managers and policymakers. Another important sub-dimension for promoting smart city projects is forming a specialized and skilled team that is acknowledged by all institutions in the city and oversees the planning, development and management processes and performance measurements in smart city projects.

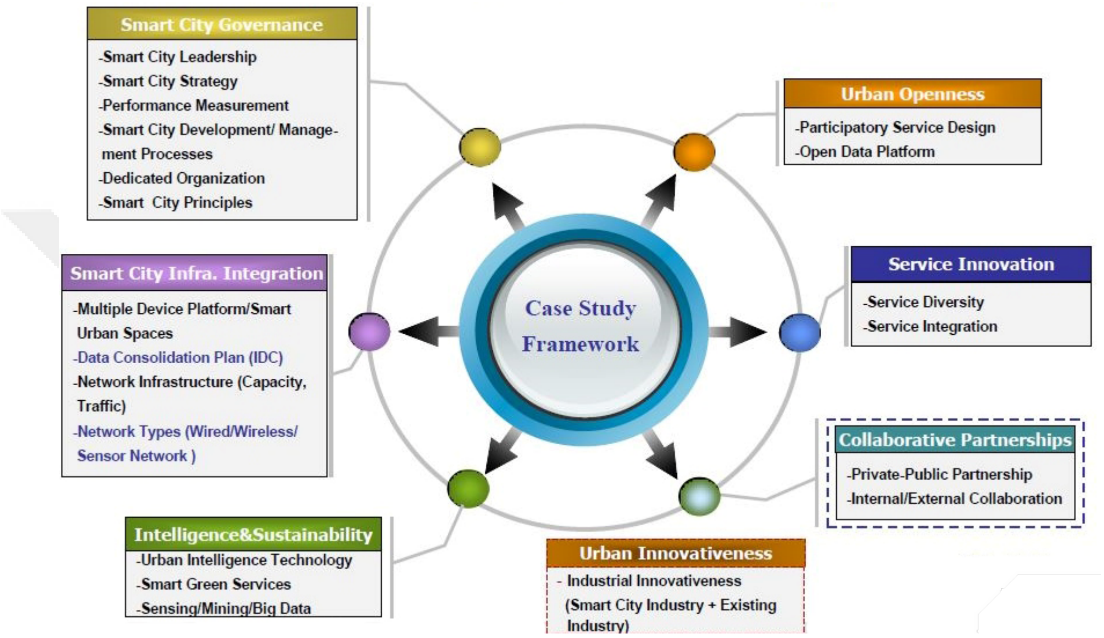


Figure 2.9: The Framework of Smart City Analysis (Lee et al., 2013)

Consequently, the goal of this framework is to serve as a guide for managers to build and develop smart cities projects. Each dimension can be analyzed individually so the innovativeness level of the smart city in that domain can be measured.

2.3.1.4 The smart city piano

Pfaeffli et al. (2016) framework combines practical management experience and academic research in order to deliver a broad framework that guides city leaders in turning their cities into smart cities starting from the idea initiating phase until the effective implementation and operation of the smart city project. Based on the challenges that encounter cities and what cities need to do when implementing a smart city project, the framework is developed to include the following seven keys:

- Technology/infrastructure where it’s important to fit the new technology into the existing systems in the city, test the new technology with a prototype and clarifying the ownership and management for the infrastructure whether it’s governmental or private entity.
- A Business case where three cases are identified as following: smart city projects that will generate revenues, other projects will lead to cost saving and finally some smart city projects will cause a negative cash flow. In effect, quantifying revenues or saving is essential for identifying unexpected smart city projects benefits. On the other hand, cities must consider different financing models for smart city projects where the budget is different according to the size of the city whether it’s a credit funding from banks or philanthropy from private organizations and sponsors etc.
- Politics since the success of smart city implementation relies on the political agendas and leaders support whether in getting funds or allocating resources.
- Regulations can affect smart city projects implementation whether they are local, regional and national regulations.
- Governance/organizational structure in which decentralized smart city projects daily management is recommended besides having top-down strong governance on a regular basis to prevent endless discussions. Likewise, it is necessary to form smart city project team consisting of all key stakeholders in order to facilitate cross-departmental smart city projects work. Also, setting up a private-public partnership (PPP) as private entities provide cutting-edge innovation and public institutions provide insurance for the security of citizen’s data and city services instead of being totally owned and controlled by a private company.
- The right recruitment of skilled experienced people according to the project nature leads to a successful smart city project implementation.
- - Soft/cultural factors where open culture, which is the collaboration between public institutions, private and educational institutions is crucial for successfully implementing smart city projects. Furthermore, internal communication towards employees and external communication towards citizens are significant for the acceptance and success of smart city initiatives.

The previously mentioned key factors are categorized and arranged into three groups “to be played in sequence like chords” because of their interconnectivity and chronologically dependent. First, assess the potential for a city which means the technological solutions needed for smart city project and financing this project. Thereafter, prepare the foundation for proceeding in the smart city project by the assessment of political support and regulations that have an impact on the success of smart city projects. Finally, manage the execution of smart city project by defining which organizational structure and skills needed for the success of the smart city project and the cultural/soft skills that might affect this success.

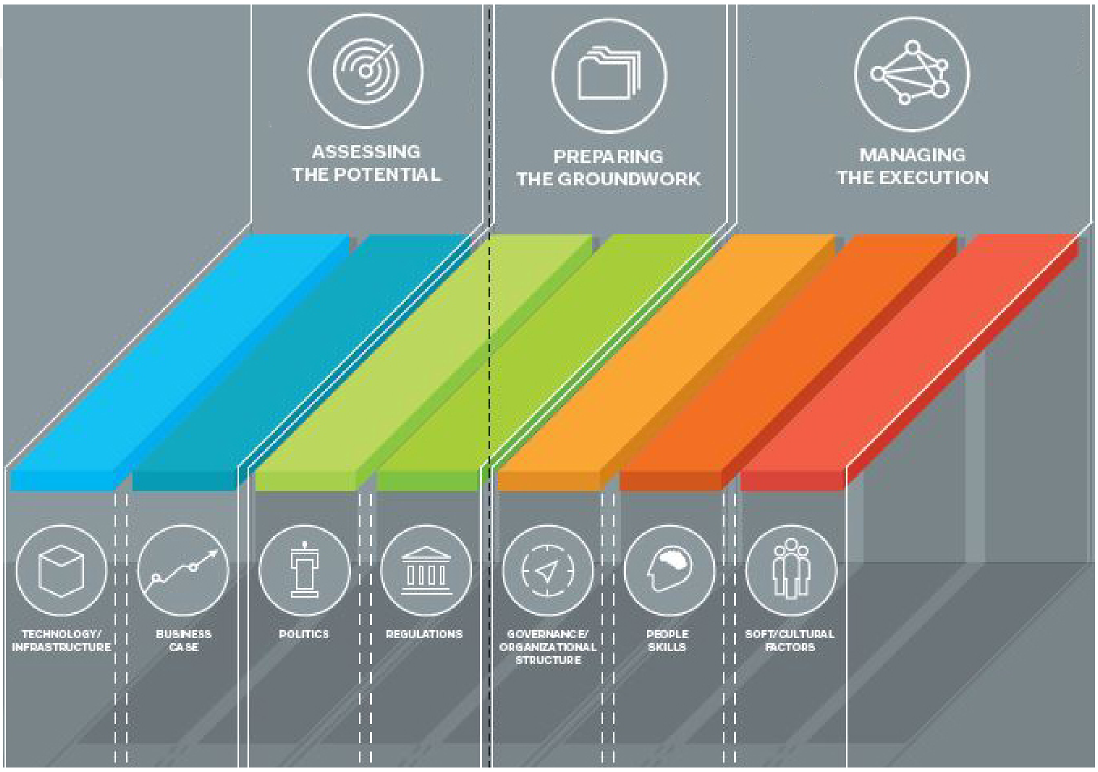


Figure 2.10: The Smart City Piano (Pfaeffli et al., 2016)

The ultimate objective of the smart city piano tool is to build a structured approach to assess the requirements to implement smart city projects and balances key factors in order to increase the success of smart city projects and the coordination among partners, therefore cost savings.

2.3.1.5 SMELTS framework for smart city initiatives

Joshi et al. (2016) SMELTS’ framework helps both public and private sectors to successfully plan and implement smart city initiatives by identifying six significant factors and analyzing how they influence the success of smart city projects. These six pillars are:

- Social where communication between citizens and agencies has a vital role in allowing citizens to play an active part in smart city initiatives.
- Management which in this context means implementing smart governance that includes active participation, citizens services and the use of e-government for improving communication, collaboration, data exchange, smart city services and administration.
- Economy as a key driver for smart city initiatives where innovation and sustainable economic growth and development are the ultimate goals.
- Legal components which are crucial aspects for the success of smart city projects.
- Technology as the essential driver for the smart city.
- Sustainability where the smart city can achieve a decreased carbon footprint, better quality of life, and innovative business models leading to environmental, social and economic sustainability.

This framework consists of two levels according to the factor impact on smart city initiatives. Whereas the inner level factors (Technology, economy and legal) have more influence on smart city project, the outer level factors (sustainability, social and management) influence smart city initiatives after getting influenced by the inner level.

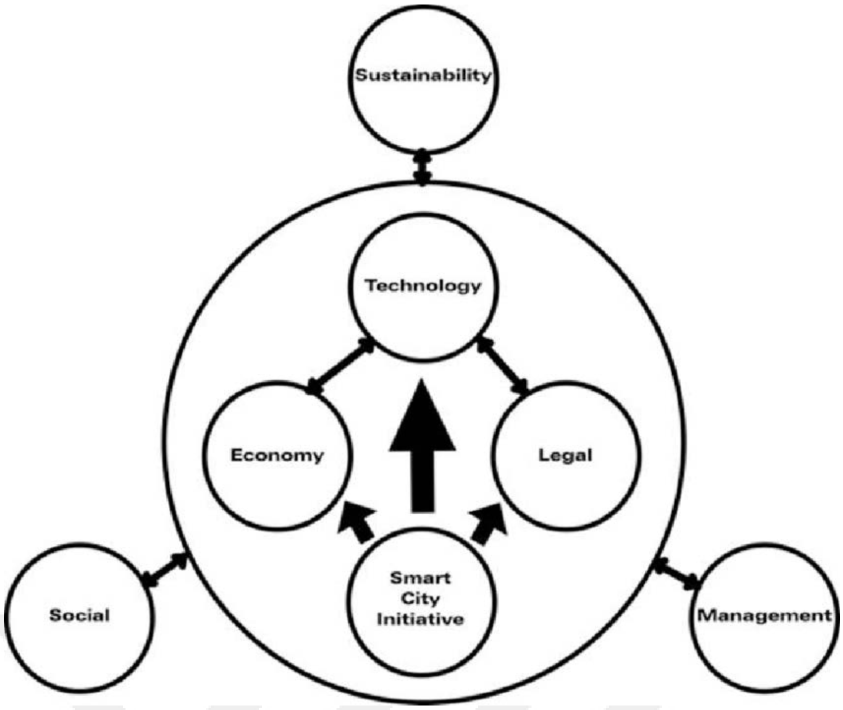


Figure 2.11: SMELTS Framework for Smart City Initiatives (Joshi et al., 2016)

2.3.1.6 The SMART framework

Ben Letaifa (2015) introduces the SMART framework to illustrate how local governments can design their smart city strategy. According to three strategy levels, five strategic phases' cities go through but even though all cities follow the similar strategizing phases; their strategy varies depending on the city's vision and values. First, the macro level which includes: strategy phase where the city vision is created and multidisciplinary phase which is the gathering of resources and stakeholders from different areas and organizing them to support the smart city initiative. Second, the mezzo level which includes: appropriation phase which means taking over citizens and all smart city participants' acceptance to ensure the project success. Next is the roadmap phase which is the detailed explicit workflow for the city transformation. Finally, the micro level which is the identification of the transformative technology for the smart city.

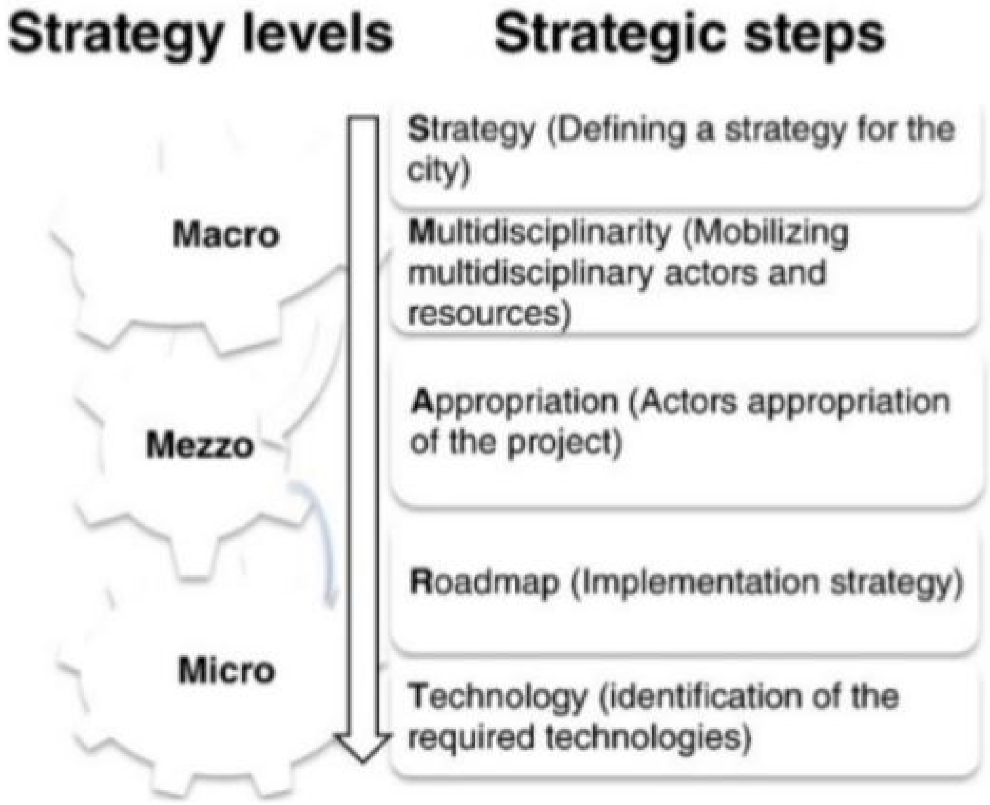


Figure 2.12: SMART Framework (Ben Letaifa, 2015)

2.3.1.7 Smart City reference model

Zygiaris's (2012) smart city reference model presents a holistic city planning framework composed of seven city layers that contain all smart city notions, policies and processes. This framework is developed by clarifying the smart innovation ecosystem and its characteristics. Layer 0, the city layer which contains the city's infrastructure, services, innovation ecosystems and citizens who are the engines of cities, furthermore, this layer describes the city readiness to implement smart policies. Layer 1, is the green layer which concerns about the city's sustainable future and environmental impact of smart solutions. Layer 2 is the interconnection layer which refers to the broadband coverage and telecom infrastructure that interconnect people, businesses and all devices in the city, etc. Layer 3, is the instrumentation layer that connects the physical world with the information world through various "hardware" such as sensors that generate real-time data. Layer 4, is the open integration layer where data is integrated which is important for smart city monitoring process. Layer 5, is the application layer that optimizes the use of city assets leading to create an intelligent application of modern technologies. Layer 6, is the innovation layer which enables innovation and produces new business opportunities and models that contribute to the long-term viability of smart city projects.

The model serves as a tool for defining a conceptual layout of a smart city and setting a planning agenda for urban innovation ecosystems by smart city planners. However, smart cities have different sizes, priorities and features, therefore, "the reference model should be tailored to local urban innovation character". Similarly, in each layer, a sustainability assessment is applied to evaluate city performance and allow sustainable investments only.

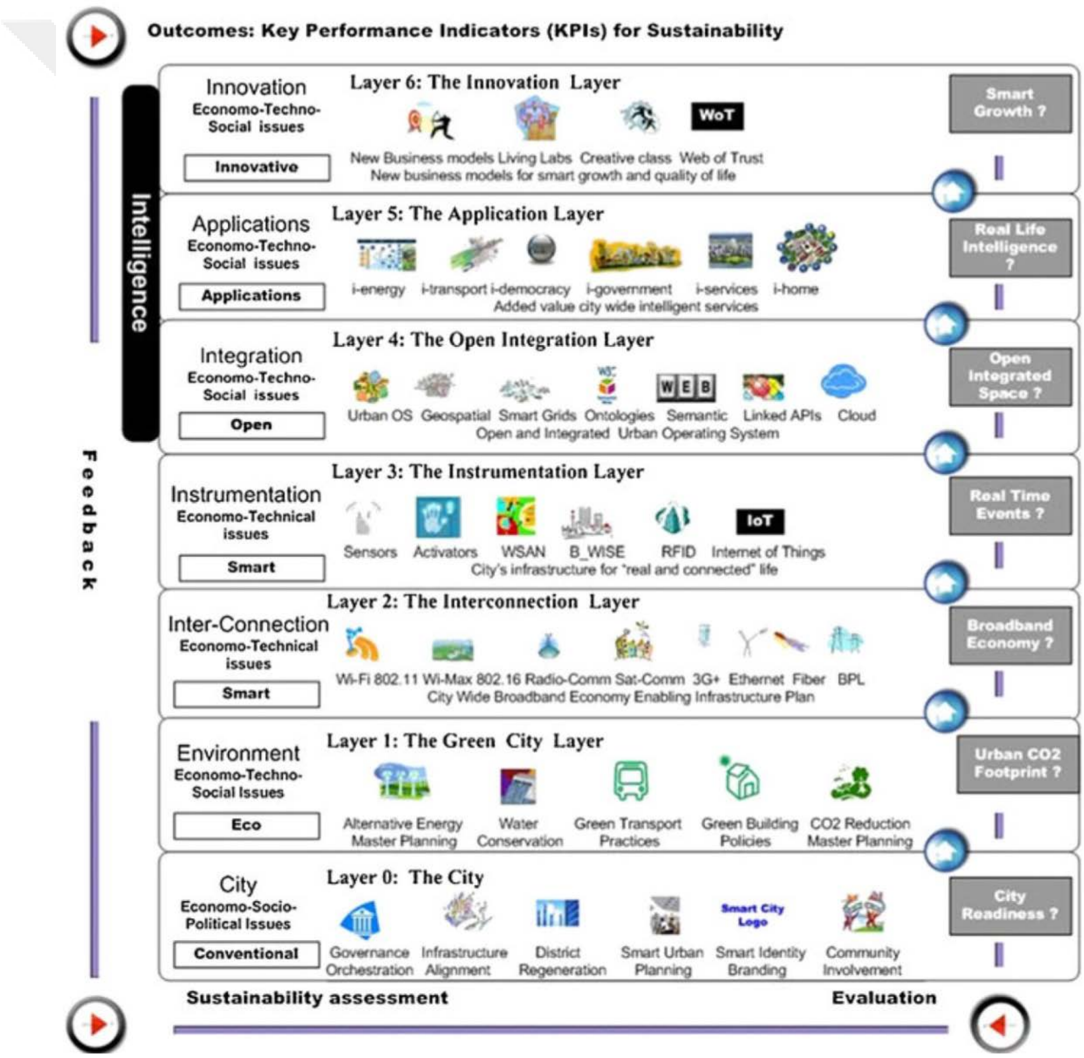


Figure 2.13: Smart City Reference Model (Zygiaris, 2012)

2.3.1.8 Smart City intellectual capital (SC-IC) framework

Dameri and Ricciardi's (2016) framework focuses on the implication of intellectual capital (IC) on the smart city from a managerial point of view. In order to adopt the IC approach to smart city studies Ricciardi suggests merging the smart city goals and IC expected outcomes resulting in five strategic goals which are value creation, competitiveness, resilience, quality of life and sustainability. Likewise, the main intangible resources should include process capital (the use of IT and high technologies or what is called smart practices), renewal capital (continues renovated projects, ideas and initiatives), institutional capital and environmental capital (intelligent of the city context whether its natural or artificial which is a new concept for the IC culture), besides the human and social capitals that are already included in smart city views. In effect, the SC-IC framework proposes that smart city organization needs a development of knowledge management to utilize knowledge about smart city projects which are quite innovative. Also, development of project portfolio management approaches which follow a strategic vision and manage the coordination among smart city projects that involve various city sub-systems. Finally, it requires a network management for the emerging network forms of organization. To ascertain the smart city success in achieving its goals, key resources should be considered which are human capital, social capital which is affected by network management, institutional and process capital which are influenced by knowledge management, environmental capital and renewal capital which is influenced by project portfolio management. Consequently, any change in SC-IC will influence at least one city sub-system in terms of its shorter-term goals (competitiveness and economic performance) and longer-term goals (resilience, sustainability and quality of life).

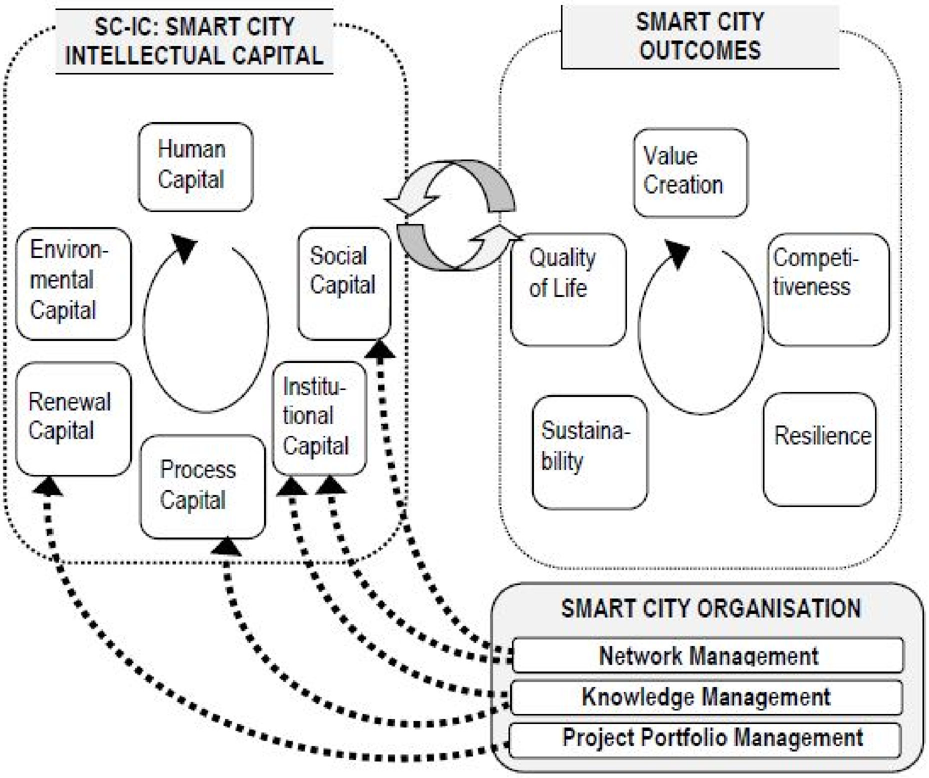


Figure 2.14: Smart City Intellectual Capital (SC-IC) Framework (Dameri&Ricciardi, 2015)

The purpose of this framework is to support smart city management practices by adopting management tools derived from knowledge management, network management and project portfolio management. Moreover, the framework suggests a new clear vision of the smart city organization as “knowledge-based, project-oriented and network-shaped type of organization”.

2.3.1.9 Smart City framework-SCF

The smart city framework acknowledges the uniqueness of each city challenges and needs, therefore, its own smart city vision and strategy. This framework which is developed by the British Standards Institute in 2014 helps managers at all levels from all sectors to develop smart city strategy by identifying the good practices. These guides consist of four components:

- Guiding principles which are developed by the collaboration with the city’s stakeholders and can help in decision making before implementing the smart city strategy.

- Key cross-city governance and delivery processes which clarify how to address challenges.
- Benefit realization to ensure that smart city project's benefits are delivered in practice.
- Important success factors to be identified, measured, and managed to ensure the success of the project.

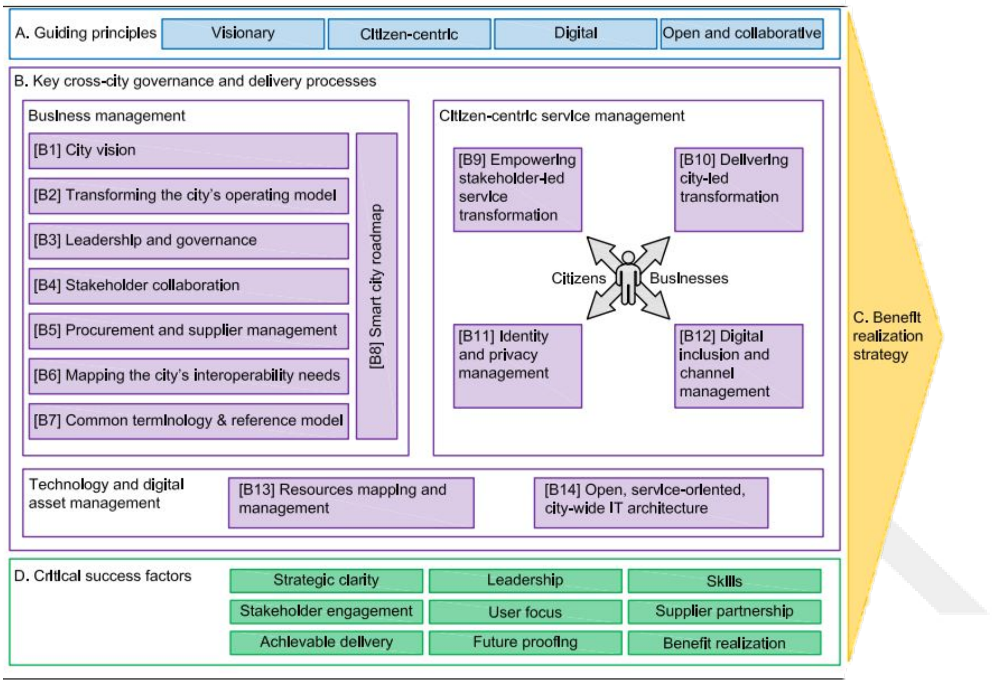


Figure 2.15: High-level structure of the SCF (BSI, 2014)

In summary, Smart City projects are both transformative and challenging. Still, no unified framework, functional model or definition has yet emerged. Nam and Pardo (2011), Chourabi et al. (2012) and Lee et al. (2013) are among the most cited authors with a smart city framework that integrates various aspects in a unique and strategic vision of the future city. While many frameworks generalize their study of the smart city aspects, Pfaeffli et al. (2016) framework focuses on the managerial implications of the smart city. Other frameworks such as Sujata et al. (2016), Ben Letaifa (2015), and Zygiaris (2012) are strategic frameworks that help to run the process for defining the details of smart city projects.

2.3.2 Smart City benchmarking tools

Smart city benchmarking assesses strengths and weaknesses of the city according to different dimensions and factors related to city smartness in order to compare different cities, indicate city performance, show good practices and set clear goals for the transformation to smart city. The smart city is a broad field and standards are still developing, yet, several smart cities benchmarking approaches were developed from a different perspective which makes it complicated to compare different cities according to different benchmarking methods. For instance, Mapping Smart Cities in the EU report considers that a successful Smart City initiative covers all the dimensions. Singhal et al. (2013) sets competitiveness parameters for the city (physical environment, social capital, finance, development, investment and user potential), while others evaluate global city performance (economy, research and development, cultural interaction, livability, environment and accessibility) such as Kourtit et al. (2014). On the other hand, Desouza and Flanery (2013) focus on the city resilience by including the social city components (people, institutions and activities), and the physical components (resources and processes).

In this thesis, classical projects success indicators will also be adapted to smart city projects success criteria. These indicators are time, cost and quality (Atkinson, 1999; Westerveld 2003). Shenhar, et al. (2007) added the impact on customers, teams and businesses to the previous indicators.

2.3.2.1 Smart Cities wheel

Cohen (2011) developed the most widely used model with six dimensions similar to Giffinger et al. (2007); which are the environment, mobility, government, economy, society and quality of life, with each dimension has three indicators. The aim of this model is to measure the city progress, help setting city strategies and figure how comprehensive the smart city approach is. However, the role of standards for implementing smart cities is ignored in the smart cities wheel model.

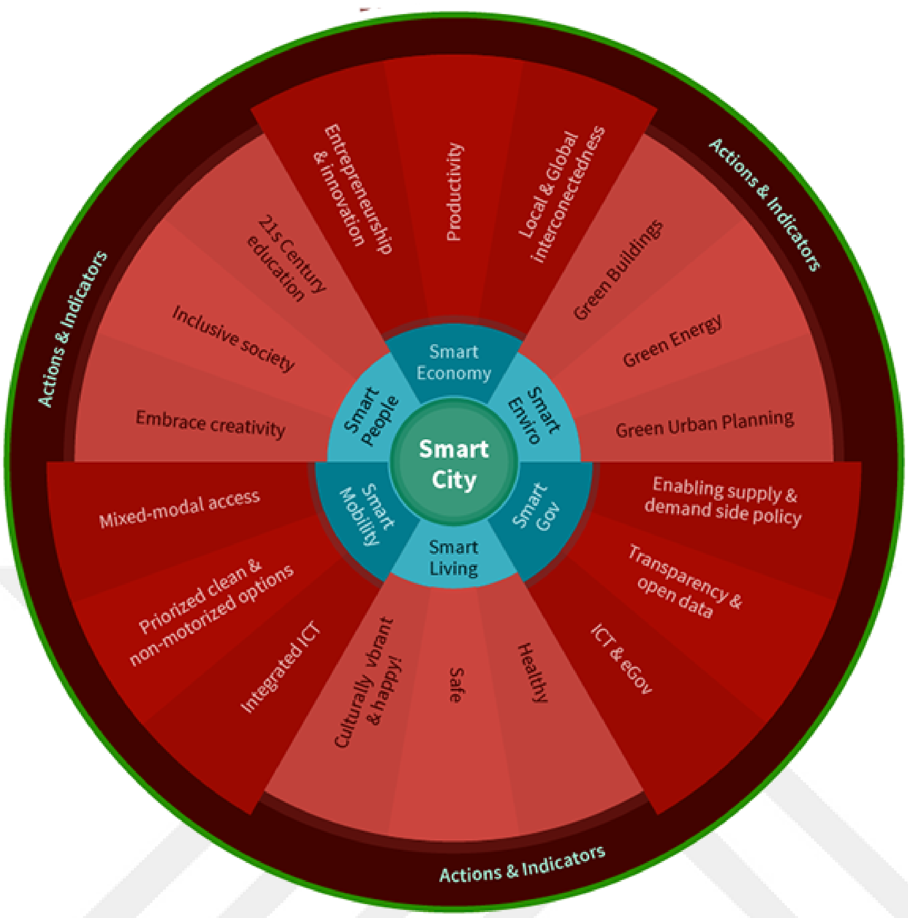


Figure 2.16: Smart Cities Wheel (Cohen, 2011)

2.3.2.2 ITU - Focus Group on smart sustainable cities

In 2014, smart city stakeholders such as academic and research institutes, technological organizations, non-governmental organizations (NGOs) and industry forums came together through a focus group for smart cities (FG-SSC) to exchange knowledge for coming up with a definition for the smart sustainable city and highlighting the significant challenges for developing standards for smart cities.

In the following, only SSC management and assessment standards will be outlined.

- Strategic planning and partnership building standards include developing guidelines and best practices for requirement analysis, mechanism and methods for strategic planning, and partnership building in SSC.

- Deployment and implementation standards include developing guidelines and best practices for deployment and implementation procedures in SSC.
- Management and administration implementation standards include developing a code of conduct for administration and management in SSC.
- Resilience and disaster recovery standards include developing guidelines and best practices for resilience and disaster recovery in SSC.
- Evaluation and assessment standards include developing recommendations for evaluation approaches for SSC.

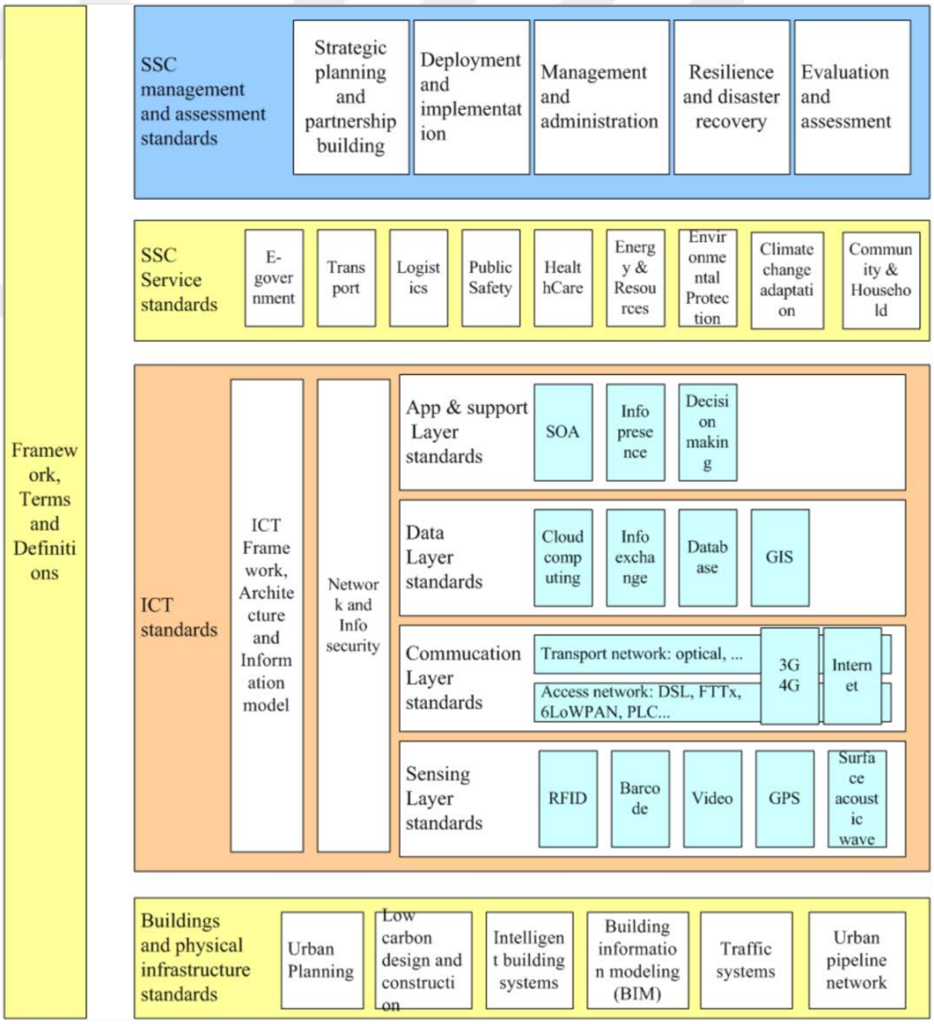


Figure 2.17: Framework for (SSC) Standards (FG-SSC, 2014)

In summary, researchers define projects success in different ways. In lieu of using classical project success indicators, smart city researchers developed specialized smart city projects key indicators.

Cohen (2011) smart city wheel is considered a comprehensive benchmarking tool where it highlights the key dimensions and factors for smart cities transformation, yet, it lacks policies and standards for implementation. Contrarily, ITU FG-SSC developed standards for smart city solutions.

Even though some benchmarking tools exist based on comparison of smart practices with other cities, there is no single model that covers all smart city aspects with respect to different city contexts and for that reason there is a need for a comprehensive taxonomy for smart cities in order to develop a holistic indicator systems and benchmarking tool for smart city project performance (Huovila et al. 2017).

2.4 Approaches to Define Smart Cities Projects

As mentioned before according to the literature smart city dimensions are economy, people, governance, environment, mobility and living. Each dimension represents a particular aspect of the city where a smart project aims to achieve smart city goals in efficiency, sustainability and high quality of life. A project is considered smarter when it's associated with a higher number of dimensions (Monzon, 2015).

(Winden et al. 2016) Assume that smart city projects are those projects which use new technology to generate economic, social and ecological value, are run by multiple organizations as a partnership and include innovation or experimentation.

Fleischmann and Heuser (2015) define the smart city projects as the ones that are driven by institutions which develop the project objectives according to the challenges and key performance indicators (KPIs) of the smart city vision with the involvement of citizens. Two approaches can be identified; top-down approach (the project is initiated by government or institutions) or bottom-up (project is initiated by citizens) approach.

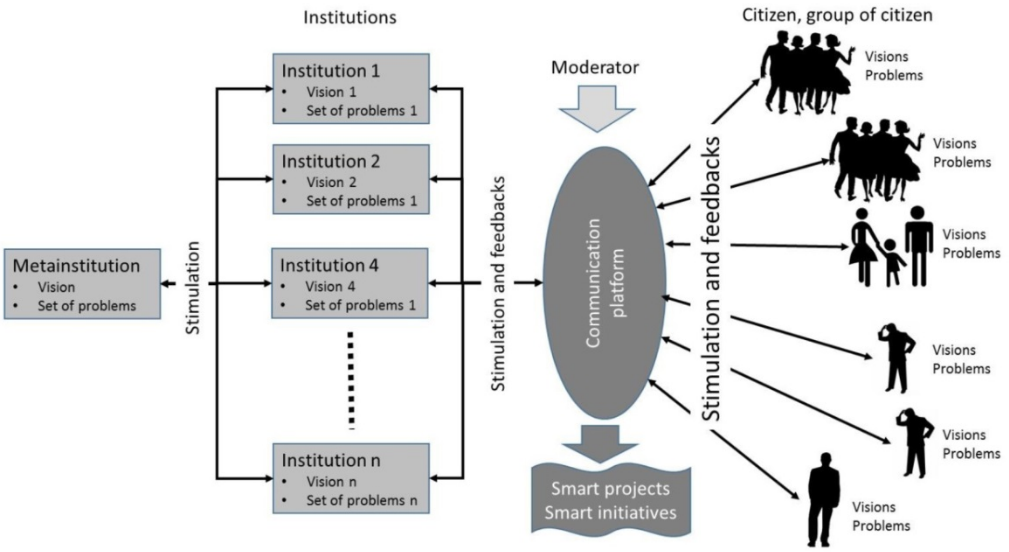


Figure 2.18: Structure for Defining Smart Projects (Fleischmann& Heuser, 2015)

2.4.1 Smart City projects characteristics

ASCIMER (assessing smart city initiatives for the Mediterranean region) has recognized three characteristics for smart city projects that impact and contribute to the smart city. First, innovation where technology should be promoted in smart city projects to solve the old urban issues in a new innovative way. Second, integration where smart city projects should help creating interconnected systems and managing knowledge and information efficiently among them, increase communication between institutions and citizens and increase cooperation between public and private institutions and civil entities. Third, inclusion where some smart city projects engage people in their projects, if not, smart city projects should communicate benefits of the project to citizens.

Figure 2.19: Smart city projects characteristics (Monzon, 2015)

Smart city projects use of ICT is the main factor of these projects and the tendency to implement strategies to face city challenges rather than executing a specific project is another feature. After defining the concept of the smart city, projects are grouped according to different dimensions where project action plans are listed and several approached for development are considered. Then, project sub-actions are defined which represent the smart city strategies.

Moreover, ASCIMER has developed an assessment tool which serves as a decision tool to evaluate whether to move on with the smart city projects or discard them. The evaluation is done in five steps as follows:

- Context and object: discerption of the city structure, characteristics, and context (intuitions, infrastructure, city challenges and project characteristics) are identified to generate enough knowledge and information that will be used in future assessments.
- Smart city project criteria: where a comparison between project characteristics and the financing institution requirements is done for checking if minimum requirements are met.
- Project quality assessments: for evaluating whether the project has the capacity to address smart city challenges or the fulfilment of smart city objectives.
- Smart city project assessment matrix: to check if the project intended to be implemented objectives actually help the city needs.

- Bankability: the technical and financial feasibility of the project.

Figure 2.20: Assessment for Smart city projects (Monzon, 2015)

Another researcher; Angelidou (2017) examines several smart city projects plans in order to identify several characteristics which are included in smart city projects planning. Those characteristics are technology and ICT, human and social capital development, promotion of entrepreneurship, collaboration and networking activities, privacy and security, locally adapted strategies, participatory approaches, top-down coordination, explicit strategic framework and interdisciplinary planning.

2.4.2 Smart operating model

Climate group presents a complex model for smart city projects where technology is a core element and policy (public education, policy orientation) and funds (incentives, coordination mechanisms) function together as a supporting system for the smart city. These systems elaborate and serve as tools for value creation and effective operation of the smart city project.

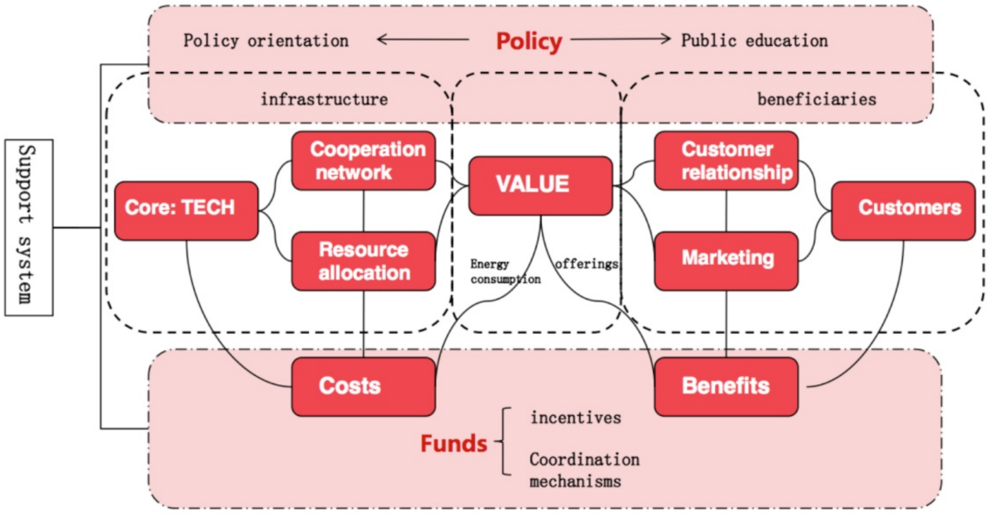


Figure 2.21: Smart Operating Model (Climate Group, 2013)

As explained above, a few models exist to describe smart city projects; however, a smart city project can be defined simply as a holistic project that has an impact towards city smartness and sustainability, increases efficiency, fosters technology, partnership, multi-stakeholders, innovation and knowledge and requires smarter project management.

2.5 Available Frameworks for Smart City Projects Management

Smart city projects are fascinating new arenas where multiple stakeholders engage and innovate together. Researchers present different types of frameworks suitable to the Smart City concept. Yet, it's rare to find a framework from a project management perspective. In the following section, different project management frameworks will be reviewed. Some are related to the smart city concept, others reflect the organization of smart city projects.

2.5.1 The project management perspective for a digital city

Anthopoulos et al. (2014) approach the smart city as a complex and large-scale project to construct a management model for the smart city that can be used by project managers. Based on the construction management project processes, project management institute body of knowledge (PMBOK, 2008) and the analysis of case studies, the digital city project management model was built. This model presents several questions a project manager should answer before implementing the project and that will guide the manager through this process. The following processes are included in the model:

- Define the project mission: which is the most critical process that includes the determination of the project scope, requirements, deliverables, duration and budget. In this process, the client (government, vendors, and university representatives and managers leading implementation) determine:
  - The generic approach (a virtual environment which software and information systems are implemented only, or mesh environment where the implementation involves construction activities that extend the project scope).
  - The project objectives.
  - ICT solutions by using effective requirements engineering method to support the decision of using suitable solutions for the city.
  - The project design to support the project technological viability.
  - The project viability evaluation: Using a viability model where stakeholders' satisfaction has to be justified.
  - Stakeholders management by using the power/interest matrix to determine involvement and communicate with key stakeholders in the project.
- Mobilize the resource base: where the procurement system, contractors and payments methods are determined by the project manager. However, if there a coalition among clients this process becomes complex and performed according to who finances the project, who owns the project deliverables and coalition's forms and legislation.
- Ride the project life cycle that is the budget, time, quality and risk control for the project to be implemented. This process involves generating definition and solutions to problems, decreasing client's surprise, budget, program, quality, information's flow and risk management. In addition, the client should determine the followings:
  - A- The project manager and his/her capability to execute the project efficiently.

- B- The project management method e.g. construction management methodology, PRINCE2, etc.
- C- Designate the operation manager of the project.

- Lead the project coalition: in this process two things should be determined:
    - A- The project organization schema: functional organization (specialization based on a function or role), project organization model (based on the company's functional operations) or integrated organization model.
    - B- The leadership style: autocratic or paternalistic style.

Table 2.3: The project management model for a digital city Model (Anthopoulos et al., 2016)

Question	*Description / Potential Answer*
Process 1: Defining the Project Mission	
Q1. Which generic (not a technological) approach will be followed?	*Virtual, mesh, innovative*
Q2. Which are the project objectives?	*Vision, axes of precedence, milestones*
Q3. Which are the most appropriate ICT solutions for my case?	*Requirements engineering for solution selection according to suitability criteria*
Q4. Which is the architecture of the project? (project design)	*n-tier, SOA, modular*
Q5. How viable is my project?	*Viability model construction*
Q6. Who are the stakeholders and what is their power/interest role in the project?	*Power/Interest matrix definition*
Process 2: Mobilizing the Resource Base	
Q7. Which is the procurement system that will be followed?	*Procurement system's identification according to (a) who finances the project; (b) who owns the projects' deliverables; (c) which is the coalition's form and the respective procurement legislation*
Process 3: Riding the Project Life Cycle	
Q8. Who is the project manager, and how efficient and effective he is to ride the project and the project organization?	*Project manager determination. Project organization's orientation.*
Q9. Which is the project management method that will be followed?	*e.g. PRINCE2, construction management methods etc.*
Q10. Who is the operation manager of the project	*Operation manager's identification.*
Process 4: Leading the Project Coalition	
Q11. What schema is followed by the project organization?	*Functional/Project based/Integrated*
Q12. What leadership style is followed by the project manager?	*Autocratic, patermalistic*

2.5.2 Organizing Smart City projects

Winden et al. (2016) analyzed the managerial aspect of smart city projects from different domains in Amsterdam in order to set up and manage smart city projects successfully. Moreover, they described a smart city project as the one that includes a development for new technology to create economic, social or environmental value, boost innovation and run by a partnership. Also, the partners in smart city project are identified as the following: private companies, knowledge institutions, NGOs, public organizations, citizens and utilities. Based on a thorough study of several projects, several key factors were identified:

- Determine and share the project goals, scope and focus of its activities in a clear way with each partner in the project.
- Build the right ecosystem of partners while keeping them open to new inputs and determine what role the city administration plays.
- Determine the project ownership and the leadership that connects all partners and drive the project forward. Also, the commitment of each partner in the project.
- Determine the created value (economic, social, and environmental) by the project as a whole and by each individual partner. Also, the unexpected value such as the creation of new knowledge even if the project has failed.
- Determine the degree of user involvement which depends on the type and goal of the project. Similarly, determining the users wherein smart city projects multiple user types exist such as users as clients, users as citizens, users as employees, active users, and passive users. Moreover, which stage the users involve where studies showed that users should be involved from the beginning of the project while ensuring that each user is approached in a different way depending on the project goal.
- Data science: determining the type of used and generated data in the project, data analyzing and sharing method and data protection.
- Knowledge: determine the type of technology the project relies on and the expected new knowledge generated from several partners.

- Determine the kind of finance the project needs and how partners can share costs, benefits and risks.
- Create a viable business model in order to find follow-up financing possibilities and translate project value into actual revenue streams.
- Impact analysis: determine the project's baseline and a way to measure its impact and when to consider that it's successful.
- Upscaling: it's important to determine the project potential upscaling strategy from the beginning of the project whether it's expansion, roll-out or replication.

Smart city projects are complex and large-scale projects which typically involve many different stakeholders from within a city and from other levels of government. Despite the availability of hard and soft infrastructure and the effective use of ICT, yet many projects fail because of inappropriate management of the project. Moreover, while many researchers, publications and frameworks about smart city concept exist, there are no sufficient frameworks for smart city projects management. For the mentioned reasons, research should focus on the managerial aspects of the smart city to develop a smart and innovative approach that takes into account the uniqueness of each city's challenges and needs in order to manage smart city projects successfully.

Smart city projects challenges inspire partners, managers and city leader to come up with innovative solutions.

2.6 Smart City Projects Challenges

Although developing a smart city projects sounds really attractive to a city and attempt to make it more efficient, sustainable and livable, it can bring a lot of challenges to their development. While most academic studies focus on the technical issues, only a few addresses the managerial and organizational challenges (Chourabi et al., 2012). Smart city projects challenges include the typical project challenges and specific challenges emerging from the complexity and innovative nature of smart city projects. It's important to note that smart city projects challenges inspire partners, managers and city leader to come up with innovative solutions. In the following, the challenges that might come across managers are classified.

2.6.1 Technological challenges

Smart city projects depend extremely on technology. However, implementing digital infrastructure is challenging because of the lack of knowledge about ICT systems and compatible software, the security and privacy problems where systems may get hacked or infected by viruses etc., the high cost of installing, operating and maintaining IT systems and the cost of training and hiring IT specialists (Kogan&Lee, 2014).

2.6.2 Financial constraints

Smart city projects require significant financial resources to adapt technology to city existed infrastructure which is more expensive than building a new smart city. The main challenges are finding who can fund the project, choosing the right investment that will create long-term efficiencies, benefits, and return, the tendency to avoid huge investments that generate long-term benefits and focusing on short-term, and the need for innovative business, operating and finance models in order to transition from pilot projects into full-scale projects (Kogan&Lee, 2014).

2.6.3 Lack of collaboration among different stakeholders and governmental restraints

Smart city projects require collaboration among private organizations, public institutions, NGOs, citizens, etc. which increase the complexity of these projects. The main challenges are poor communication and coordination among these participants, the leadership style, lack of policies for open data that enables sharing across departments and organizations, lack of support from both local government and city administration, the time taken by organizations involved in the project to make decisions and breaking down silos that hinder the success of the project (Woods et al., 2016; Kogan&Lee, 2014).

2.6.4 Managerial and organizational challenges

One of the challenges of smart city projects is their size and scope where two types of projects can be defined; Greenfield projects which are huge, long-term, and usually starts from zero and Brownfield projects which are smaller sized projects, short-term and fast implemented are usually built on existed infrastructure and are preferred by investors for generating fast revenues. Another challenge is leadership style and manager’s technical and social skills. Similarly, the lack of understanding solutions that leads to poor decisions. Also, the absence of educated and qualified teams who can work in these complex and high-tech projects, resistance to change and inadequate training are also one the smart city projects challenges. Moreover, the diversity of project’s relevant stakeholders creates conflicts about who will govern and finance or who will capture the created value. Finally, having multiple goals that do not align with the project vision can be challenging (Chourabi et al., 2012).

2.6.5 Social challenges

Smart city projects need to engage citizens and create a common understanding of the key objectives, opportunities, and challenges among all smart city project participants. The main challenges lie in how to motivate and involve citizens in smart city projects, measure and express the value created by the smart city project for citizens and change the behavior and thinking of citizens to what’s called “smart thinking” (Woods et al., 2016; Kogan, 2014; Ojo et al., 2014).

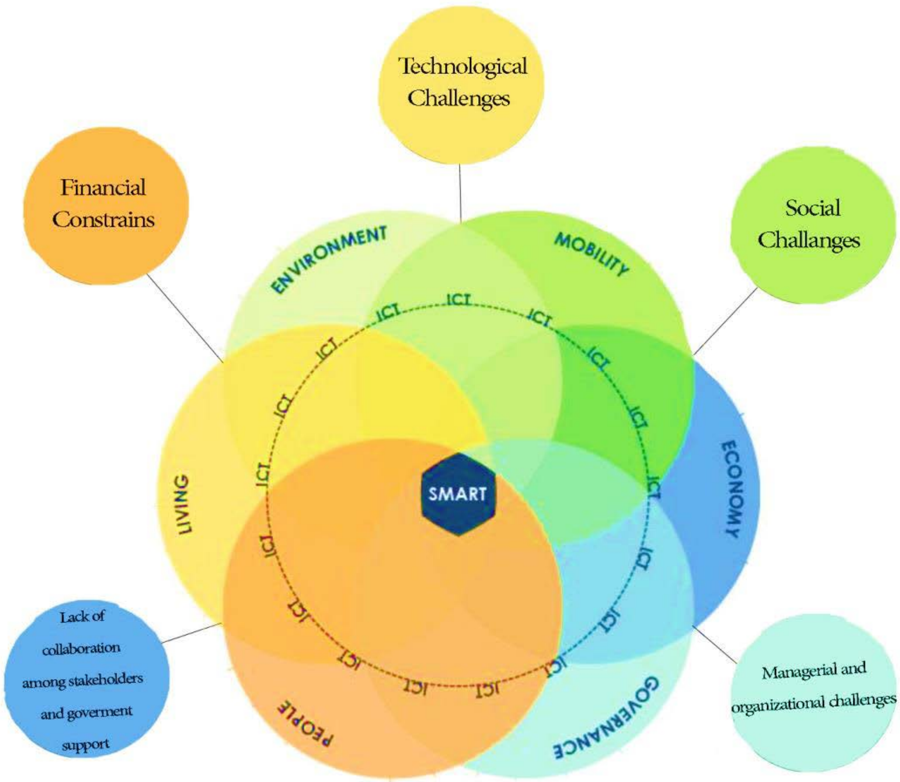


Figure 2.22: Smart City Projects Challenges

From what's mentioned above, many challenges might face smart city implementations from policy, regulations, human and technology challenges to instructional ones. The crux of the matter is that smart city projects address more than one domain and thus requiring an integrated planning and joint strategy (horizontal approach). Also, projects implementing requires new technologies that pose challenges which are different from normal standard projects.

2.7 Smart City Projects Management Success Factors

Researchers analyzed successful and failed projects so factors that contribute to the project success can be identified. Many general factors are mentioned in the literature such as IT which enables the transformation to the smart city, yet other important factors should be considered such as policy and organizational elements to guarantee the successful implementation of the project (Rodriguez-Bolivar, 2015). Before explaining the success factors, it's worth mentioning that many projects fail due to miscommunication of the project's objectives to the local community along with digital divide in the city, financial restraints and with political oppositions in the municipality.

In a report for European Union (2014) successful initiatives are defined as the following "observable indicators through the life cycle of the initiative: attracting wide support, having clear objectives aligned to policy goals and current problems, producing concrete outcomes and impacts and being imitated or scaled" (Manville, 2014).

Beurden and Andrews (2011); Achaerandio et al. (2012); The Climate Group (2013) argue that smart city initiative needs people, enabler environment and effective management and organization to the project processes. Also, a report from mapping smart cities in EU (2014) identified factors that contribute to the successful project implementation as the following:

- Have a clear vision embedded in a comprehensive city vision, objectives, goals and baseline measurement systems from the beginning of the initiatives.
- Have strong governance.
- Have a sound business case taking into account the local context.
- Have a benefits realization framework which is developed by project management institution (PMI) for organizations to identify benefits and align them with formal strategy in order to ensure that the project benefits are realized, delivered during project execution and sustained after the project ending (PMI,2016).
- It's important to have a strong local government partner as a key strategic partner and co-founder.
- Form a public-private partnership (PPP) where private partners help with expertise, technology and finance.
- The involvement of citizens and end-users.
- Successful projects require successful knowledge management where relevant data are necessary to develop business models (Manville, 2014).

Bhavsar et al. reviews success factors for designing the smart city in the literature. Eight factors concerning managerial and operational aspects are identified as follows: speed of work, labour market flexibility, the availability of workforce, productivity, developed construction management, disaster management and building information modelling (BIM). Since innovation and learning are important aspects for smart city projects, four success factors are identified in those aspects: innovative spirit, research and development, open-mindedness, ability to develop content and application (Bhavsar et al., 2016).

Harms proposes six critical success factors for developing smart city strategy that could be applied to smart city projects. First of all, it’s important to define a clear vision for the project. Secondly, focusing on humans instead of technology since humans are what make a smart city smart. Another factor is focusing on a specific topic where identifying the city’s strengths and weaknesses help in creating a stronger city strategy and similarly to project’s strategy. In addition, having a city-wide smart strategy will make small projects contribute to the general smart city strategy. Moreover, organize the work and structure the project strategy by using the smart city strategy framework for the city and adapt it to its projects. Finally, bring all stakeholders together from local governments, businesses and knowledge institutions to citizens in the smart city project (Harms, 2016).

Cardullo and Kitchin (2017) also appraise the citizen’s participation in smart city projects, define different forms of participation and the numerous roles that citizens play in these projects and suggest a “citizen-centric” smart city initiatives where citizens can develop solutions and are involved in the decision-making process.

Dameri and Ricciardi point out key issues for smart city success. These factors include: Selecting smart city projects based on higher-level smart city programs and according to an effective strategic vision, effectively coordinate smart city projects in order to avoid conflicts between projects and Continues assessments for project portfolios (Dameri&Ricciardi, 2015).

Joshi et al. indicate that team skills are important to solve projects size issue and technological challenges such as the lack of understanding new interconnected systems. Also, clear agendas and measurable deliverables are keys to overcoming multiple or conflicting goals. Furthermore, good communication and mutual trust can solve conflicts and resistance to change. Another important factor is to have a strong legal department to deal with any legal or political challenges. Moreover, analyzing the project and forecasting its budget to get budgetary approval before the project starts. Finally, managers should control project’s resources and budget to ensure sustainable development of the project (Joshi et al., 2016).

A report from IBI group identified success factors for smart city strategy as the following:

1-Develop a clear strategy based on stakeholder’s needs so that it benefits them and result in a measurable outcome.

2-Engage citizens in the smart city projects from the beginning of the development of the strategy and get the stakeholders buy-in because that will affect the project budget and acceptance during implementation.

3-Align the smart city strategy with the regional development strategies.

4-Recognize “early win” in the strategy which should include implementation timescale in order to create awareness and foundation for the smart city initiative.

5-Since smart city projects are different than other traditional projects, it’s important to use public messaging and branding for smart city strategy to support and remind stakeholders with the outcomes and benefits of the smart city project.

6-Since smart city projects are new, it’s important to exchange knowledge and learn from other projects experiences.

7-Develop key performance indicators (KPIs) to measure performance in a meaningful and understandable way for citizens and businesses in a city.

8-Integrate the implementation of ICT within the organization with the smart city strategy and involve all relevant stakeholders in the development of the strategy (Peters et al., 2017).

BSI (2014) in the smart city framework (SCF) states nine critical success factors for smart city projects which are: strategic clarity, stakeholder engagement, user focus, leadership, skills, supplier partnership, achievable delivery, future proofing (developing methods of minimizing the effects of shocks of future events in order retain value) and benefit realization.

While many studies identify success factors for the smart city in a broad view, other studies focus on the factors affecting smart city strategy development. Therefore, they share most of the success factors. However, more specific studies are needed from a project management perspective. In effect, several approaches and mechanisms can be adapted to smart city projects management in different project lifecycle in order to increase success for these projects. For example, leadership models, risk management mechanisms and innovation management. Also, it's necessary to formulate clear organizations policies that support cross-department/organization working and open-data policies to ensure the success of smart city projects.

2.8 Summary for the Literature Review

In this chapter, relevant current literature was reviewed and presented. It started with clarifying smart city concepts, introduced the available frameworks for smart city analysis and benchmarking. Later, approaches to define smart city projects were presented followed by the available frameworks for smart city projects management. Finally, smart city challenges and success factors were discussed in detail.

As discussed in this chapter, many smart city frameworks exist. However, there is no holistic smart city project management framework even in one city context.

It's important to mention that the study variables; the dependent variable (project success) and the independent variables (smart project practices) and the suggested frameworks were extracted from the previously mentioned works of other scholars and researchers in the field of the smart city.

The conceptual framework and methodology which was used to gather the required data and analyze these variables are discussed in chapter 3.

3. METHODOLOGY

3.1 Introduction

The literature review presented in the previous chapter has shown that smart city projects require effective and efficient management in order to successfully deliver this project for its stakeholders. Moreover, other studies from the literature suggest that the managerial aspects of smart city projects should be given more attention in the smart city research. Thus, this supports this study objective in developing a smart framework to manage smart city projects successfully. In the beginning, this chapter describes the research design used to test the hypotheses stated in this chapter and answer the research questions. Then, research questions, identified variables and related hypotheses will be further explained. In addition, the sampling techniques, the instrumentation and materials, data collection procedures and data analysis will all be depicted and explained. Finally, the reliability and validity of the instruments and findings will be evaluated.

3.2 Research Design and Approach

The critical stage in developing a research study is choosing the research design which links the conceptual framework, the research question and the research method (Yin, 2012). The decision about the research design is made based on the research questions and problems identified.

This research adopted a deductive approach where researcher develops a theory or a hypothesis based on general observations and plans a research strategy to test the formulated hypotheses.

This research focuses on the management characteristics that enable effective management of smart city projects particularly within the context of Europe smart cities initiatives. This research aims to gain a comprehensive understanding of the smart city concept from a project management perspective and examine and evaluate the effects of smart management on the smart city projects success. Therefore, a quantitative design was chosen to assess the relationship between smart management and project success in each phase of the project cycle.

First, a literature review was conducted in the theoretical chapter where most of the relevant contents about smart city concepts, smart city frameworks, smart city projects critical success factors and challenges in the smart city projects implementation have been presented and discussed thoroughly in the research work. The intention was to discover what previous studies have been done in this area in order to take the essence and avoid repetition. Thus, offer related knowledge contribution. In this study research, the conceptual framework variables have been extracted from the literature findings in order to identify the practices for smart city projects management and investigate influences for smart success practices in project management (SSP) affecting the smart city project success.

Second, since the objective of this study is to assess how project management smart success practices influence project success, quantitative methodology where a nonexperimental correlational form of research was found to be the most appropriate design to use. That is the correlational design in which investigators use the correlational statistic to describe and measure the degree of association (or relationship) between two or more variables (Creswell, 2012). Consequently, this research employed the quantitative approach in order to come up with a clear relationship between variables and test the hypotheses (Johnson & Cristenson, 2004). In general, the quantitative study is most appropriate when the study intends to "answer questions about relationships among measured variables, with the purpose of explaining, predicting and controlling phenomena" (Leedy & Ormond, 2001). This leads to using quantitative survey data to identify statistical relationships to confirm the study hypotheses. In addition, the study was cross-sectional in that data was collected across several projects at one point in time in order to delineate the relationship among the study variables (Sekaran, 2003).

Figure 3.1: Research Approach

Resulting from what's mentioned above, quantitative method is the most appropriate for this kind of research, therefore, it was chosen to conduct the study. The empirical chapter includes questionnaires that were distributed to smart city professional in Europe. It's important to note that getting reliable results requires a combination of both theoretical and empirical studies where the empirical one affirms the findings from the literature review. The purpose of data analysis is to determine the real critical success practices in smart city project management functions which theoretical research alone can't ascertain these practices.

3.3 Conceptual Framework

The conceptual framework allows researchers to focus on the literature review, develop an understanding for the context of the study, provide a structure and collect data to answer research questions (Gale et al., 2013).

The study conceptual framework was built on the literature review/analysis. This framework evaluates the impact of smart management practices on project success and identifies the relationships between smart project management practices and project success. Similarly, based on the literature discussed in chapter 3, this study identified 23 critical smart city practices and categorized them according to the four management functions, as shown in table 3.1.

Table 3.1: Smart City Projects Success Practices according to the ManagementFunctions (Planning, Organizing, Leading, and Controlling)

Smart Planning Practices (SPP)	Smart Organizing Practices (SOP)	Smart Leading Practices (SLP)	Smart Controlling Practices (SCP)
Clear Strategy	Project Structure	Leadership Style	R&D
Clear Deliverable Objectives	Public Private Partnership (PPP)	Team Skills	Knowledge Exchange
Define Benefits for All Stakeholders	Branding For SC	Training	Data Exchange
Define Project Management Method		Good Communication	KPIs Measurement
Government Support		Change Management	
User Involvement and Support		Cross-Organizational Collaboration	
Innovative Business Model		Knowledge Management	
Determine ICT Solutions		Cross-Functional Management	
Risk Management			

Figure 3.2 illustrates the study conceptual framework. The first outer section of this framework examines the relationships between smart planning practices, smart organizing practices, smart leading practices and smart controlling practices and project success. These factors were developed based on the combination of the available studies on important success and failure factors for smart city projects. The second inner section of this framework considers the effect of the project size and context (city, industry, partnership) on the relationships between smart planning practices, smart organizing practices, smart leading practices and smart controlling practices and project success. Project success is estimated according to cost, quality, time, sustainability (the project is sustainable in terms of people, profit and planet or what’s called TBL) and the created value (benefits to all stakeholders and generated new knowledge).

The hypotheses development and the relationship between smart practices and project success is described in the next sections.

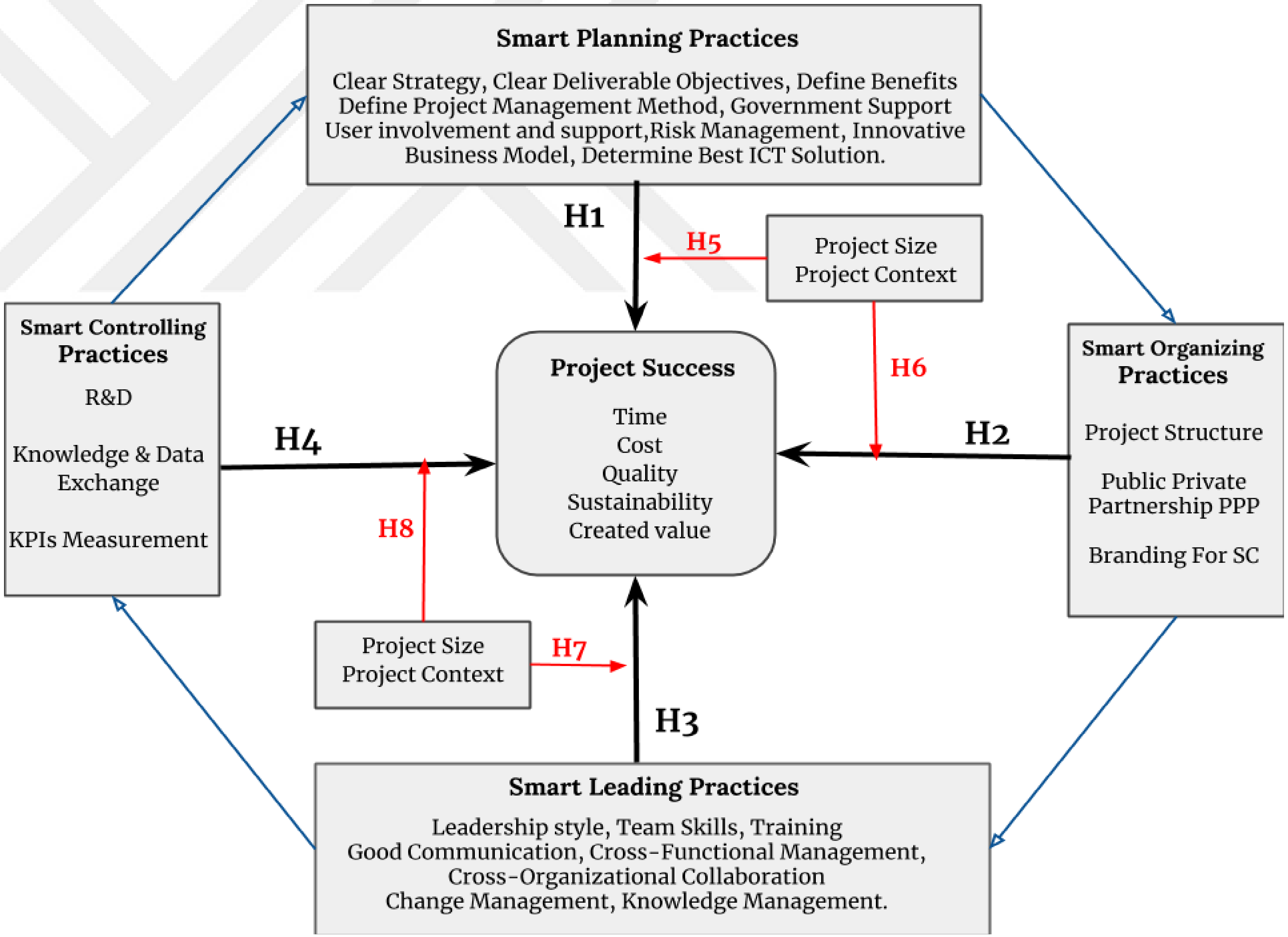


Figure 3.2: Conceptual Framework of Smart Project Management Practices and Smart Project Success

3.4 Research Questions

The purpose of this study is to explore smart city concept from a managerial aspect, address issues relating to smart city projects management and develop a framework that will assist project managers and organizations to incorporate smart practices into their strategies and management.

Following the literature review conducted in chapter two, the main questions guiding this research were identified as follows:

RQ1: How to run smart city projects efficiently and effectively in Europe?

RQ2: How do smart project management practices influence the project success in Europe?

The first question focuses on identifying success factors that affect smart city projects management practices and performance in Europe, while question two concentrates on the impact of success factors on the project's success.

To answer the main research questions, the following sub-research questions were addressed in this study:

SRQ1: What are the available frameworks for smart city projects management?

SRQ2: What are the main challenges facing smart city projects?

SRQ3: What are the success factors that lead to successful implementation of smart city projects?

This study attempts to answer these questions using literature review and empirical study (questionnaire) and test the hypotheses which have been formed according to the literature review. To illustrate, in RQ2 some success factors effects for smart project management will be measured in term of time, quality, cost, sustainability and the created value for stakeholders which are the smart success criteria for smart city projects. On the other hand, sub-questions assisted in gaining knowledge about the study concept and building a thorough understanding for smart city projects and practices in order to form a clear idea and perspective to answer the main questions. The research questions will be fully addressed and answered in the analysis and results chapter.

3.5 Research Hypotheses

To create the hypotheses, essential information was presented where literature review guided building the research questions. Furthermore, in this study hypotheses have been tested to define the false or true status for the statement about variable’s relations. The following hypotheses were developed and tested in order to answer the second research question (RO2):

H1: There is a statistically significant positive relationship between project smart planning practices (SPP) and project success.

H10: There is no statistically significant positive relationship between project smart planning practices (SPP) and project success.

H2: There is a statistically significant positive relationship between project smart organizing practices (SOP) and project success.

H20: There is no statistically significant positive relationship between project smart organizing practices (SOP) and project success.

H3: There is a statistically significant positive relationship between project smart leading practices (SLP) and project success.

H30: There is no statistically significant positive relationship between project smart leading practices (SLP) and project success.

H4: There is a statistically significant positive relationship between project smart controlling practices (SCP) in the initiation phase and project success.

H40: There is no statistically significant positive relationship between project smart controlling practices (SCP) and project success.

H5: The impact of smart planning practices (SPP) on project success is moderated by project size and project context.

H50: Project size and project context has no effect on the impact of smart planning practices (SPP) on project success.

H6: The impact of smart organizing practices (SOP) on project success is moderated by project size and project context.

H60: Project size and project context has no effect on the impact of smart organizing practices (SOP) on project success.

H7: The impact of smart leading practices (SLP) on project success is moderated by project size and project context.

H07: Project size and project context has no effect on the impact of smart leading practices (SLP) on project success.

H8: The impact of smart controlling practices (SCP) on project success is moderated by project size and project context.

H80: Project size and project context has no effect on the impact of smart controlling practices (SCP) on project success.

According to the hypotheses above, this study attempts to evaluate smart success factors (SSP) of smart city projects management which are divided according to the management function into smart planning practices (SPP), smart organizing practices (SOP), smart leading factors (SLP) and smart controlling practices (SCP). These are independent variable and project success is the dependent variable measured by timing, quality, cost, created value and sustainability. Based on these explanations the hypotheses were presented using both the null (Ho) and alternative (H1) hypotheses.

3.6 Operationalization of Variables

Operationalization of the variables allows the transition from the theory presented in chapter two to empirical research which improves the quality and soundness of the research (Nwagbogwu, 2011). The independent and dependent variables in this study were identified from the literature review and conceptual framework. The independent variable affects the dependent variable in a positive or a negative manner and that effect is what this study will investigate. In addition, another type of variables exists which are moderate variables that explain weakness or strength between dependent and independent variables (Saunders et al., 2009). The independent variables were measured on a continuous measurement scale with a range of 1 to 5 whereas, the dependent variable was measured on a continuous measurement scale with a range of 1 to 4. Also, the factors pertaining to the independent variables of smart planning practices, smart organizing practices, smart leading practices and smart controlling practices and the dependent variable of project success were drawn from the literature reviewed in chapter two and were used to test the hypotheses.

Dependent variable

As mentioned in the conceptual framework, the dependent variable for Hypothesis 1 to 8 is project success, where project success is measured by time, cost, sustainability, quality and created value for stakeholders.

Participants were asked to specify how they evaluate project success according to smart success criteria (SSC).

Independent variables

The independent variables for Hypothesis 1 to 8 include:

- Smart project planning practices.
- Smart project organizing practices.
- Smart project leading practices.
- Smart project controlling practices.

Moderating variables

The moderating variables for Hypotheses 5 to 8 include:

- Project size.
- Project context.

As mentioned earlier, four management functions factors were investigated to assess their correlation to the project success factors. Factors were operationalized as follows:

Smart project planning, organizing, leading and controlling were all measured on a Likert scale with a range from 1 to 5. Choices on the questionnaire were coded as 1 (strongly agree), 2 (agree), 3 (neutral), 4 (disagree) and 5 (strongly disagree). Thus, lower scores indicated that smart project practices influence/affect the project success in the practical project management, and higher scores indicated that smart project practices don't influence/affect the project success in the practical project management.

Project success criteria include identified factors from the literature review which are time, cost, sustainability, quality and the created value for stakeholders. These factors were measured on a Likert measurement scale with a range of 1 to 4. Response choices on the questionnaire were coded as 1 (strongly agree), 2 (agree), 3 (disagree) and 4 (strongly disagree). Thus, lower scores of each criterion/factor indicated that the factor is a key indicator of project success and higher scores indicated that the factor is irrelevant to project success.

3.7 Population and Sampling Techniques

The study population of the main research project consists of professionals working in smart city projects within Europe covering smart energy, water, mobility, buildings and governmental sectors. The reason why countries of the EU-28 were selected in this study relates to the fact that Europe has the largest number of smart city projects around the worlD according to a new study conducted by Navigant Research in 2017. Moreover, the study included both successful and failed projects because each project status represents a valuable practical experience and knowledge for this research. On the other hand, project managers, developers, supervisors, project professionals in the field of information technology, business and financial services, engineering and construction, telecommunications, industrial processes and other members who have different roles in the smart city projects were considered in the population because each individual can have an impact on the smart city project success, have different roles and responsibilities and possess valuable practical knowledge. In addition, the study population was chosen according to several reasons. First, the population presents a wide type of projects which enable its potential to be applicable to several organizations and projects types. Second, it includes a variety of projects size and complexity. Third, large population helps to minimize sampling variance of estimates. Appendix C provides a list of the cities which were included in the analysis.

Since it was not possible to give participants the equal chance of being “selected in relation to their proportion within the total population”, probability sampling in terms of random sampling has not been applied (Denscombe, 2007). Moreover, a complete list of the population was not available, therefore, non-probability convenience sampling has been chosen as the sampling method.

A non-probability convenience sampling is one where data is collected from population members who are conveniently available to participate in the study. Therefore, data were collected from managers or other professionals involved in the smart city projects in European cities of different sizes and were accessible by the researcher.

Since there are no statistics for how many managers or professional work in smart city projects, the study population is unknown. Therefore, the minimum sample size was calculated using the below formula by considering the setting the confidence level 90%, the sample proportion 0.3 or 30% and margin of error ±8% (Israel, Glenn 1992).

$$n= \frac{Z^2 P\ (P-1)}{e^2} \tag{3.1}$$

Z: standard normal deviation set at 90% confidence level (1.645)

P: The sample proportion.

e = Margin of error.

Based on what’s mentioned the minimum sample size should be 90.

The convenience sampling technique is applicable to both qualitative and quantitative studies, although it is most frequently used in quantitative studies (Etikan et al., 2016). Based on this, 100 participants were selected as a sample from a wide range of projects in multiple sectors in Europe covering a variety of professionals with different backgrounds and experiences. Consequently, a purposive sampling has been chosen because the respondents group were selected under the judgment that these groups “will best be able to help answer the research question and meet the objectives” (Saunders and Lewis, 2012). Participant’s positions in the project and some other related details will be mentioned in Appendix D.

3.8 Data Collection

The whole process of gathering essential data according to the research objective and preparing it for analysis is known as data collection process where varieties of approaches exist for the data collection (Saunders et al., 2009).

This study utilized a survey methodology employing an online questionnaire as an instrument for data collection due to the geographic dispersion of respondents, its easy administrative, time and cost saving and its efficiency in data delivering (Andrews, Nonnecke & Preece, 2003). An online survey service; qualtrics.com, was used to host the questionnaire and an invitation to participate was sent by email and LinkedIn. The questionnaire was launched on the 15th of February and was kept online for 1.5 months. Afterwards, items scores were downloaded and data analysis started immediately.

The construction of the questionnaire is adopted from the PMEC which was designed by Morisson and Brown (2004) to measure the effectiveness of project management practices (the independent variables). Moreover, items from the theoretical research framework were added to the questionnaire to cover all of the variables being investigated since the study is fairly new besides the lack of an appropriate instrument for assessing practices in the smart city projects context. Also, to summarize the characteristics of the sample, demographic questions were included in the survey.

The PMEC was designed by Morrison and Brown to "assess the multiple dimensions and levels of projects and to integrate various internal and external factors to capture a better view of the processes and capabilities of managing projects" (Nwagbogwu, 2011).

For this study, project success was operationally defined as the operational outcomes construct, as measured in PMEC. On the other hand, project management effective and efficient practices were operationalized according to two constructs, goal clarity and leadership, as measured in PMEC, besides the items extracted from the literature.

As a further matter, the set of questionnaires use Likert Scale. Likert Scale inquires respondents to answer to a series of statements by indicating whether they strongly disagree, disagree, neutral, agree or strongly agree with each statement. Each response is associated with a point value and an individual's score is determined by summing the point values in each statement (Gay &Airasian, 2000).

This research questionnaire used closed questions answered by reference to Likert scale in order to support statistical analysis. The questionnaire is divided into 6 sections. First five sections consist of 33 questions related to the four smart success factors (planning, organizing, leading and controlling) and eight questions about project size and context which are answered following a 5-point Likert scale. In addition, the fifth section includes nine questions about project success criteria which are answered following a 4-point Likert scale as mentioned before. The concluding section contains nine questions related to the respondent's demographic information such as professional qualification, years of experience, location, and project overview. The full questionnaire can be found in Appendix A.

The research questionnaire was distributed among different smart city projects professionals. The responders include; projects managers, developers, supervisors etc. Generally, the acceptable response rate for online surveys is 11% or more (Saunders et al. 2009). The study questionnaire was sent out to 450 potential respondents and was returned by 110 respondents. This corresponds to a 24% response rate.

Additionally, to ensure that participants have a clear understanding of the purpose of the questionnaires, a cover letter which describes the study purpose was attached to the questions (Appendix B).

3.9 Data Analysis

Data analysis procedure is considered the most important and difficult part of quantitative research and it requires to be carried out with high accuracy. In pursuance of a new outcome, data analysis test, classify, rearrange and probably compare and combine the gathered data (Yin, 2009). To collect, organize, analyze, test and present data the study used several computer-based programs.

Firstly, the survey data was gathered through online survey service; qualtrics.com and answers were imported as dataset in Microsoft Excel, so it could be used in the statistical software package; Statistical Package for the Social Sciences (SPSS) to be analyzed in a statistical manner which help generates descriptive statistics, validity and reliability test, quantitative hypothesis testing and confirming relationships among study variables. The analysis is conducted using the descriptive analysis, reliability analysis, correlational analysis, simple linear regression, multiple regression and ANOVA test.

The descriptive analysis was to investigate the smart practices, smart success criteria and the profiles of the respondents and projects. For example, the analysis would determine the experience in the project management field, type of industry, etc. Considering the fact that the sample size is small, a reliability test was conducted.

Besides standard descriptive analysis, the study used the bivariate correlation to affirm the correlation between dependent and independent variables. Also, multiple regression (MMR) method was applied to determine the relationships of variables on the presence of moderator variables.

The hypotheses were tested statistically with the help of simple linear regression model. Pearson coefficient and Regression coefficients were measured using SPSS. To illustrate, when testing the hypothesis if Pearson coefficient is statistically greater than 0.05, the null hypothesis is rejected, and a positive correlation between the smart success practice and smart city project success is concluded. Conversely, if R equals zero, then there is no linear association between the dependent variable and the independent variables. Similarly, all hypotheses concerning each smart city project management function and smart success criteria were tested by using F, t-statistics, R and R-square coefficients.

as aforementioned, one of the study objectives is to investigate the relationship between smart management practices during the project lifecycle and project success. Therefore, the linear regression model was the appropriate statistical tool for testing the hypotheses.

On the other hand, the survey includes two questions which are linked with additional practices and new success factors in the projects of respondents which are not mentioned in the items of this research questionnaire. For that reason, qualitative data analysis is conducted to retrieve the input of respondent’s real-life practices and ground realities of the projects beyond the factors discussed in theory or in previous researches.

Chapter 4 will include the detailed analysis process. Based on the results the hypotheses will be accepted or rejected. Finally, both theoretical and empirical findings will be discussed and compared in order to present the study conclusive result and its implications.

3.10 Validity and Reliability

Since each academic research can impact the future studies, the validity and reliability hold a critical role in the conducted research.

Quantitative research using a questionnaire method represents positivism as the underlying philosophy of research (Sobh &Perry, 2006). Positivist research is grounded in objectivity and researcher independence which ascertain the validity and reliability of the findings (Remenyi & Pather, 2006). Reliability and validity establish the truthfulness, credibility and believability of the study (Neuman, 2014).

The validity in a quantitative study reflects the trustworthiness of the study results (Joppe, 2000).

The extent of generalizability of the results of a study from a sample to a population is called external validity. To improve external validity, the study population was chosen to reflect several professional with different experiences from different projects across multiple sectors. However, convenience sampling was chosen so the generalizability of the study is within the population who was willing to participate in this study and other population with the characteristics of this study population. Also, to minimize the threats in constructing validity, multiple measures of variables were used in the research (Johnson & Christensen, 2008). For instance, the study design included multiple measures of project success (time, cost, and quality, sustainability and stakeholder benefits) and smart city project management smart practices.

The reliability of a study means enabling future researchers to achieve similar and consistent results when replicating the study of the same addressed phenomenon. In other words, it is the degree of repeatability of results, so they represent the total population accurately.

To determine the reliability of the instrument (questionnaire) over the collected data in the study, SPSS was used to calculate Cronbach’s alpha. In social science, Cronbach’s alpha coefficient should be 0.70 or higher in order to have an “acceptable” reliability (Pallant, 2010).

3.11 Summary of the Research Methodology

The conceptual framework, hypotheses, research methods and study design were discussed in this chapter. The research was a combination of desk study and surveys.

The aim was to analyze smart success practices (SSP) in order to make conclusions on how (SSP) affect the smart city project success. The study employed a quantitative research design for data collection which was conducted through a web-based questionnaire. A total of 450 smart city project professionals were invited to participate in the study and the surveys were sent to the participants via email and LinkedIn. Finally, data analysis and reliability and validity were discussed.

Chapter 4 includes the analysis of quantitative and qualitative data collected from the survey and the descriptive statistics for the demographic variables. It also presents the findings, tests the hypotheses and addresses the research questions.

4. DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter is based on the analysis of quantitative and qualitative data collected from the survey of professionals who work in different projects in Europe. The initial section of the analysis is related to the SPSS based statistical treatment of quantitative data. The qualitative data is explained with the help of discussion of reviewed literature. The final data of 100 filled questionnaires are included in this analysis. Reliability test of research instrument is also conducted for the collected data. The components of this analysis are descriptive, correlation and linear regression analysis.

4.2 Quantitative Data Analysis

This section deals with the analysis of quantitative data collected from a self-administered survey in an online setting and through e-mails and LinkedIn. The multiple statistical tools applied to this data to test the stated hypotheses are mentioned in the previous chapter.

4.2.1 Reliability analysis

Reliability analysis were conducted to verify the internal consistency of the research instrument used for this research. The independent variable of project success and four dependent variables smart planning practices, smart organizing practices, smart leading practices and smart controlling practices of smart projects are included in this analysis. The scale variables in a five-point Likert scale are used to check the reliability.

Table 4.1: Reliability Statistics

Case Processing Summary			
		N	%
Cases	Valid	77	77.0
	Excluded[a]	23	23.0
	Total	100	100.0

Cronbach's Alpha	N of Items
.941	48

The case processing summary showed above in table 4.1 comprised of the valid 77 cases with excluded 23 missing cases in various variables. Listwise deletion based on all variables in the procedure. The results of Cronbach Alpha show .941 for 48 items, which is well above the threshold value of 0.7 for a reliable scale. Therefore, the instrument is found highly reliable for this research.

The reliability analysis of separate variables was also performed to check the internal consistency of variables separately.

Table 4.2: Reliability **S**tatistics for each Variable

Variables	Cronbach's Alpha	No. Of Items
Smart planning practices	.828	15
Smart organizing practices	.836	8
Smart leading practices	.865	12
Smart controlling practices	.749	5
Project sucess	.813	8

According to the results, the reliability of independent and dependent variables is above the threshold of .7 for Cronbach alpha value. These values showed that the research instrument is internally consistent and reliable for all the research variables.

4.2.2 Descriptive analysis

The descriptive statistics used to check the mean of collected data for each variable and the results are shown in the tables below.

The 5-point Likert scale was coded as the following:

5= strongly disagree, 4= Disagree, 3= Neutral, 2= agree and 1= strongly agree.

Table 4.3: Descriptive Analysis for SPP

SPP	Smart Planning Practices	Minimum	Maximum	Mean	Std. Deviation
P1	Project goals are clearly defined at start-up	1	4	1.71	.795
P2	Project goals are made clear to all participants	1	4	1.64	.746
P3	Project has clear deliverable objectives	1	5	1.90	.870
P4	Project benefits are identified for all stakeholders at start-up	1	4	1.91	.854
P5	Project risk is identified	1	4	2.08	.872
P6	Customers/users are involved in the project	1	5	1.82	.947
P7	Project management method is defined	1	5	2.20	.921
P8	Business model is well determined	1	5	2.12	.998
P9	Project sponsors strongly support the project	1	5	1.88	1.008
P10	Local government supports the project	1	5	1.81	.940
P11	Citizens support the project	1	5	2.02	1.054
P12	Available policies don't encounter with the project agenda	1	5	2.38	.993
P13	The project relies on ICT solutions	1	5	2.72	1.026
P14	Project size affects the planning function	1	4	2.39	.827
P15	Project context affects the planning function	1	5	2.36	.894

For the Smart Planning Practices in projects, the important attributes are with mean values below two, because the scale shows ‘1 for strongly agree’ and ‘2 for agree’ options. Hence, the clear goal setting (P1, mean=1.71), goals clarity to all participants (P2, mean=1.64), support of local government (P10, mean=1.81) and involvement of customers/ clients in the project (P6, mean=1.82) are found important. However, the high mean resulted on the reliance of project on IT solutions (P13, mean=2.72), the effect of project size on planning (P14, mean=2.39) and impact of project context (P15, mean=2.36) makes these attributes less important.

Table 4.4: Descriptive Analysis for SOP

SOP	Smart Organzing Practices	Minimum	Maximum	Mean	Std. Deviation
O1	Project structure is defined	1	5	1.85	.829
O2	Team responsibilities are clarified	1	5	1.70	.701
O3	Partnering between public and private businesses	1	5	2.02	1.023
O4	Use of innovative funding for project	1	5	2.47	1.032
O5	Activities are well defined	1	5	1.99	.921
O6	A smart city project brand is developed	1	5	2.51	1.055
O7	Project size affects the organizing function	1	4	2.30	.878
O8	Project context affects the organizing function	1	4	2.25	.930
O1	Project structure is defined	1	5	1.85	.829
O2	Team responsibilities are clarified	1	5	1.70	.701
O3	Partnering between public and private businesses	1	5	2.02	1.023
O4	Use of innovative funding for project	1	5	2.47	1.032

For the Smart Organizing Practices in projects, the important attributes are with mean values below two. Hence, the clear defined project structure (O1, mean=1.85), defined team responsibilities (O2, mean=1.70) and well-defined activities (O5, mean=1.99). However, the high mean resulted for items of use of innovative funding (O4, mean=2.47) and developed smart city project brand (O5, mean=2.51) makes these attributes less important.

Table 4.5: Descriptive Analysis for SLP

SLP	Smart Leading Practices	Minimum	Maximum	Mean	Std. Deviation
L1	Appropriate project manager is assigned	1	5	1.70	.847
L2	Leadership style is defined	1	5	2.23	.923
L3	Team members are well experienced in their position	1	4	2.01	.925
L4	Training is provided for all project team members	1	5	2.10	.900
L5	Communication among all stakeholders	1	5	1.46	.702
L6	Change management practices are taken by the project leader	1	4	2.10	.845
L7	Project is taking advantage of previous projects experience	1	5	1.95	.904
L8	Knowledge is shared among team members	1	5	1.65	.784
L9	Collaboration is effective among team members	1	4	1.54	.702
L10	Collaboration among stakeholders	1	5	1.76	.845
L11	Project size affects the leading function	1	4	2.17	.819
L12	Project context affects the leading function	1	5	2.13	.929

For the Smart Leading in Practices in projects, the important attributes are with mean values below two, because the scale shows ‘1 for strongly agree’ and ‘2 for agree’ options. Hence, the sharing of knowledge between team members (L8, mean=1.65), effective team collaboration (L9, mean=1.54), shareholders collaboration (L10, mean=1.76) and assigning of an appropriate project manager (L1, mean=1.70). However, the high mean resulted on the leadership style (L2, mean=2.23) and impact of project size and context on the leading function (L11, mean=2.17), (L12, mean=2.13) makes these attributes less important.

Table 4.6: Descriptive Analysis for SLP

SCP	Strategic Project Controlling	N	Minimum	Maximum	Mean	Std. Deviation
C1	Project monitoring and reporting mechanisms	81	1	5	1.81	.868
C2	Continues data and knowledge exchange	80	1	5	1.70	.848
C3	Research and development are continuing process in the project	81	1	5	1.85	.882
C4	Project size affects the controlling function	81	1	4	2.15	.923
C5	Project context affects the controlling function	81	1	5	2.20	.928

For the Smart Controlling Practices in projects, the important attributes are with mean values below two. Hence, the continuous exchange of data and knowledge (C2, mean=1.70), mechanism of monitoring (C1, mean=1.51) and R&D activities (C3, mean=1.85) shown low mean values. However, the high mean resulted for project context effect on monitoring (C5, mean=2.20) and effect of project size (C4, mean=2.15) makes these attributes less important.

Table 4.7: Descriptive Analysis for SSC

PS	Smart Success Criteria	N	Minimum	Maximum	Mean	Std. Deviation
S1	The project is completed with the planned budget	79	1	4	2.04	.759
S2	The project is completed with the planned time	79	1	4	2.11	.768
S3	The project delivered and meets all specification in the planning stage	78	1	4	2.03	.702
S4	The project result benefits all stakeholders	79	1	4	1.62	.722
S5	Project creates a positive impact on people	79	1	4	1.37	.603
S6	Project creates a positive impact on environment	79	1	4	1.39	.587
S7	Project creates a positive impact economically	79	1	4	1.51	.677
S8	Project generated new knowledge	79	1	4	1.59	.707

For the Smart Success Criteria, the important attributes are with mean values below two, because the scale shows ‘1 for strongly agree’ and ‘2 for agree’ options. Hence, the benefit of the project to all stakeholders (S4, mean=1.62), positive impact on people (S5, mean=1.37), positive impact on the environment (S6, mean=1.39) and positive impact on the economy (S71, mean=1.51) are found as important success attributes. However, the project completion on time (S2, mean=2.11) and completion in a proper budget (S1, mean=2.03) gained less preference by respondents.

In conclusion, the cumulative descriptive of all variables is shown in table 4.6 below.

Table 4.8: Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Ownership	44	1	3	2.32	.883
Size	41	1	3	2.05	.740
Status	41	1	3	1.39	.666
Experience	45	1	3	1.40	.688
SPP	100	1.00	4.20	2.0627	.49833
SOP	87	1.00	4.75	2.1365	.63356
SLP	84	1.00	4.25	1.8998	.53785
SCP	80	1.00	4.20	1.9525	.62783
Project Success	78	1.00	3.50	1.7067	.45398
Valid N (listwise)	39				

The above shown descriptive analysis of average score of all variables interprets that the nominal variables of project size, ownership, status and experience have a range of values from 1-3. Most of the smart city projects are joint (PPP) projects with medium size due to high mean values. Whereas, the status of projects is mostly ongoing with respondents lie in low experience range due to less mean values. Moreover, the mean value of scale items is also above average on a five-point Likert scale because the scale shows '1 for strongly agree' and '2 for agree' options, therefore, more proportion of agreement or neutrality found in responses. Another evident feature is the large proportion of missing values so that only 39 cases were selected listwise that have no missing value in any of the variables. This high proportion of missing value shows lack of knowledge in respondents about all attributes of management of projects.

4.2.3 Correlation analysis

The correlation analysis selected to perform on this data set was the bivariate correlation to see the pairwise relationships of all variables. The results of the analysis are shown in table 4.8

The results for project success as the dependent variable showed that there is a significant and positive relationship between project success and other four dependent variables. For instance, the correlation of project success with smart project planning SPP is .457, with smart project organizing SOP is .58, with smart project leadership is .465 and with smart project controlling is .516. All these relationships are highly significant at .000 for 99% confidence interval. Moreover, the other strong correlation coefficients are found between SOP and SLP at .757, SOP and SCP at .798, and SLP and SCP at .707. All these correlations showed a perfect positive relationship, therefore, the project success is found strongly related with the selected four functions of smart project management.

Table 4.9: Correlational Analysis

Correlations

		SPP	SOP	SLP	SCP	Project Success
SPP	Pearson Correlation	1	.649**	.614**	.592**	.457**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	100	87	84	80	78
SOP	Pearson Correlation	.649**	1	.757**	.798**	.586**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	87	87	84	80	78
SLP	Pearson Correlation	.614**	.757**	1	.707**	.465**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	84	84	84	80	78
SCP	Pearson Correlation	.592**	.798**	.707**	1	.516**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	80	80	80	80	77
Project Success	Pearson Correlation	.457**	.586**	.465**	.516**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	78	78	78	77	78

**. Correlation is significant at the 0.01 level (2-tailed).

4.2.4 Relationships of variables

Linear regression model was selected to perform the hypotheses testing in this research. The assumptions set for the linear regression in this research are:

1. Variables have linear relationships.
2. The independent variables and residuals have no correlations, that is the correlations among independent variables are not affected the linear regressions, since only one independent variable is considered for one hypothesis testing.
3. Equal Variance or homoscedasticity is satisfied.

The results of these tests are explained in the following section.

1-Project success and smart project planning

The hypothesis stated for this relationship is as follows:

H1: There is a statistically significant positive relationship between project smart planning practices (SPP) factors and project success.

$H1_0$: There is no statistically significant positive relationship between project smart planning practices (SPP) and project success.

This hypothesis is tested statistically with the help of simple linear regression model. Enter is the default method used for testing of each hypothesis. The Pearson coefficient is set at 0.05 levels for accepting a hypothesis.

Table 4.10: Regression Result- Project Success and Smart Project Planning

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.457[a]	.209	.199	.40637

a. Predictors: (Constant), SPP

The model summary shown in the above table is for the regressions coefficients of dependent variable Project success and the independent variable of smart planning practices (SPP). This model summary shows a strong relationship between dependent and independent variables. The value of R is 0.457 and of R-square is .209. Therefore, it is found that project success dependence on SPP is 45.7%. Thus, a high level of dependence is the result of the positive value of regression coefficient.

Table 4.11: ANOVA Result- Project Success and Smart Project Planning

ANOVA[b]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.319	1	3.319	20.098	.000[a]
	Residual	12.551	76	.165		
	Total	15.870	77			

a. Predictors: (Constant), SPP

b. Dependent Variable: Project Success

The best fit of the regression model is verified with ANOVA or analysis of variance test. The ANOVA results are an indication of regression value of 3.319 with residual of 12.551. However, the strong value of F is 20.098 with a significant p-value of .000. The p-value is found much below than the threshold of .05, therefore, the results are significant and the regression is found best fit for the relationship.

Table 4.12: Coefficients- Project Success and Smart Project Planning

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.831	.201		4.141	.000
	SPP	.423	.094	.457	4.483	.000

a. Dependent Variable: Project Success

The last table of coefficients concludes the discussion. T-statistics is applied and coefficients of regression equation are formed. According to these results, the Beta coefficient is positive at .457 that shows a direct relationship between project success and SPP. T-value is 4.483 which are higher than the threshold of 2.5 in the normal distribution. The results are significant with the p-value of .000 for 0.01 significance level. The constant is also significant with t-value 4.141 at .000 p-values. Therefore, the values of F, t-statistics and R-square in above-shown analysis provide ample evidence that there is a statistically significant positive relationship between project smart planning practices (SPP) factors and project success. Hence, the hypothesis H1 is accepted, whereas null hypothesis H10 is rejected.

2-Project success and smart project organizing

The hypothesis stated for this relationship is as follows:

H2: There is a statistically significant positive relationship between project smart organizing practices (SOP) factors and project success.

$H2_0$: There is no statistically significant positive relationship between project smart organizing practices (SPP) and project success.

This hypothesis is tested statistically with the help of simple linear regression model. Enter is the default method used for testing of each hypothesis. The Pearson coefficient is set at 0.05 levels for accepting a hypothesis.

Table 4.13: Regression Result- Project Success and Smart Project Organizing

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.586[a]	.344	.335	.37015

a. Predictors: (Constant), SOP

The model summary shown in the above table is for the regressions coefficients of dependent variable Project success and independent variable of smart planning practices (SOP). This model summary shows a strong relationship between dependent and the independent variables. The value of R is 0.586 and of R-square is .344. Therefore, it is found that project success dependence on SOP is 58.6%. Thus, a high level of dependence is the result of the positive value of regression coefficient.

Table 4.14: ANOVA Result- Project Success and Smart Project Organizing

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.457	1	5.457	39.829	.000[a]
	Residual	10.413	76	.137		
	Total	15.870	77			

a. Predictors: (Constant), SOP

b. Dependent Variable: Project Success

The best fit of the regression model is verified with ANOVA or analysis of variance test. The ANOVA results are an indication of regression value of 5.457 with residual of 10.413. However, a strong value of F is 39.829 with a significant p-value of .000. The p-value is found much below than the threshold of .05, therefore, the results are significant, and regression is found best fit for the relationship.

Table 4.15: Coefficients- Project Success and Smart Project Organizing

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.820	.147		5.597	.000
	SOP	.415	.066	.586	6.311	.000

a. Dependent Variable: Project Success

The last table of coefficients concludes the analysis when t-statistics is applied and coefficients of regression equation are formed. According to these results, the Beta coefficient is positive at .586 that shows a direct relationship between project success and SOP. T-value is 6.311 which are higher than the threshold of 2.5 in the normal distribution. The results are significant with a p-value of .000 for the 0.01 significance level. The constant is also significant with t-value 5.597 at .000 p-values. Therefore, the values of F, t-statistics and R-square in above-shown analysis provide ample evidence that there is a statistically significant positive relationship between project smart organizing practices (SOP) factors and project success. Hence, the hypothesis H2 is accepted, whereas null hypothesis H0 is rejected.

3-Project success and smart project leadership

The hypothesis stated for this relationship is as follows:

H3: There is a statistically significant positive relationship between project smart leadership practices (SLP) factors and project success.

$H3_0$: There is no statistically significant positive relationship between project smart leadership practices (SLP) and project success.

This hypothesis is tested statistically with the help of simple linear regression model. Enter is the default method used for testing of each hypothesis. The Pearson coefficient is set at 0.05 levels for accepting a hypothesis.

Table 4.16: Regression Result- Project Success and Smart Project Leading

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.465[a]	.217	.206	.40447

a. Predictors: (Constant), SLP

The model summary shown in the above table is for the regressions coefficients of dependent variable Project success and the independent variable of smart planning practices (SLP). This model summary shows a strong relationship between dependent and independent variables. The value of R is 0.465 and of R-square is .217. Therefore, it is found that project success dependence on SLP is 45.7%. Thus, a high level of dependence is the result of the positive value of regression coefficient.

Table 4.17: ANOVA Result- Project Success and Smart Project Leading

ANOVA[b]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.436	1	3.436	21.005	.000[a]
	Residual	12.433	76	.164		
	Total	15.870	77			

a. Predictors: (Constant), SLP

b. Dependent Variable: Project Success

The best fit of the regression model is verified with ANOVA or analysis of variance test. The ANOVA results are an indication of regression value of 3.436 with residual of 12.433. However, F value is 21.005 with a significant p-value of .000. The p-value is found much below than the threshold of .05, therefore, the results are significant, and regression is found best fit for the relationship.

Table 4.18: Coefficients- Project Success and Smart Project Leading

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.970	.167		5.804	.000
	SLP	.385	.084	.465	4.583	.000

a. Dependent Variable: Project Success

The last table of coefficients concludes the discussion. T-statistics is applied and coefficients of regression equation are formed. According to these results, the Beta coefficient is positive at .465 that shows a direct relationship between project success and SLP. T-value is 4.583 which are higher than the threshold of 2.5 in the normal distribution. The results are significant with a p-value of .000 for 0.01 significance level. The constant is also significant with t-value 5.804 at .000 p-values. Therefore, the values of F, t-statistics and R-square in above-shown analysis provide ample evidence that there is a statistically significant positive relationship between project smart planning practices (SLP) factors and project success. Hence, the hypothesis H3 is accepted, whereas null hypothesis H30 is rejected.

4-Project success and smart project planning

The hypothesis stated for this relationship is as follows:

H4: There is a statistically significant positive relationship between project smart planning practices (SCP) factors and project success.

$H4_0$: There is no statistically significant positive relationship between project smart planning practices (SCP) and project success.

This hypothesis is tested statistically with the help of simple linear regression model. Enter is the default method used for testing of each hypothesis. The Pearson coefficient is set at 0.05 levels for accepting a hypothesis.

Table 4.19: Regression Result- Project Success and Smart Project Controlling

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.516[a]	.266	.256	.39142

a. Predictors: (Constant), SCP

The model summary shown in the above table is for the regressions coefficients of dependent variable Project success and the independent variable of smart planning practices (SCP). This model summary shows a strong relationship between dependent and independent variables. The value of R is 0.516 and of R-square is .266. Therefore, it is found that project success dependence on SCP is 51.6%. Thus, a high level of dependence is the result of the positive value of regression coefficient.

Table 4.20: ANOVA Result- Project Success and Smart Project Leading

ANOVA[b]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.168	1	4.168	27.202	.000[a]
	Residual	11.491	75	.153		
	Total	15.658	76			

a. Predictors: (Constant), SCP

b. Dependent Variable: Project Success

The best fit of the regression model is verified with ANOVA or analysis of variance test. The ANOVA results are an indication of regression value of 3.319 with residual of 12.551. However, the value if F is 27.202 with a significant p-value of .000. The p-value is found much below than the threshold of .05, therefore, the results are significant and regression is found best fit for the relationship.

Table 4.21: Coefficients- Project Success and Smart Project Leading

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	.991	.145		6.810	.000
	SCP	.370	.071	.516	5.216	.000

a. Dependent Variable: Project Success

The last table of coefficients concludes the discussion. T-statistics is applied and coefficients of regression equation are formed. According to these results, the Beta coefficient is positive at .516 that shows a direct relationship between project success and SCP. T-value is 5.216 which are higher than the threshold of 2.5 in the normal distribution. The results are significant with a p-value of .000 for the 0.01 significance level. The constant is also significant with t-value 6.810 at .000 p-values.

Therefore, the values of F, t-statistics and R-square in above-shown analysis provide ample evidence that there is a statistically significant positive relationship between project smart planning practices (SCP) factors and project success. Hence, the hypothesis H4 is accepted, whereas null hypothesis H40 is rejected.

4.2.5 Relationships of variables in presence of moderator variables

The moderator variables of project size, project ownership and project status are used to validate the relationships of dependent and independent variables. Moderator multiple regression (MMR) method was applied to determine the relationships of variables on the presence of moderator variables. In these moderator variables, project size and project context are used. The project context is the representation of project ownership and project status in this analysis. By using the creation of dummy variables for project size (small), project status (on-going) and project ownership (public) were used for comparison of results.

Table 4.22: The Moderator Variables

Ownership	Numeric	8	0		None	None	8	Right	Scale
Size	Numeric	8	0		None	None	8	Right	Scale
Status	Numeric	8	0		None	None	8	Right	Scale
Experience	Numeric	8	0		None	None	8	Right	Ordinal
SPP	Numeric	8	2		None	None	8	Right	Scale
SOP	Numeric	8	2		None	None	8	Right	Scale
SLP	Numeric	8	2		None	None	8	Right	Scale
SCP	Numeric	8	2		None	None	8	Right	Scale
ProjectSucc...	Numeric	8	2		None	None	8	Right	Scale
ProjectCont...	Numeric	8	2		None	None	8	Right	Scale
small	Numeric	8	0	small	None	None	10	Right	Nominal
SPP_x_small	Numeric	8	2		None	None	13	Right	Nominal
Ongoing	Numeric	8	2	Ongoing	None	None	10	Right	Nominal
Public	Numeric	8	2	Public	None	None	10	Right	Nominal
SPP_x_ong...	Numeric	8	2		None	None	15	Right	Nominal
SPP_x_Pub...	Numeric	8	2		None	None	14	Right	Nominal
SOP_x_Pu...	Numeric	8	2		None	None	14	Right	Nominal
SOP_x_small	Numeric	8	2		None	None	13	Right	Nominal
SOP_x_ong...	Numeric	8	2		None	None	15	Right	Nominal
SLP_x_ong...	Numeric	8	2		None	None	15	Right	Nominal
SLP_x_small	Numeric	8	2		None	None	13	Right	Nominal
SLP_x_public	Numeric	8	2		None	None	14	Right	Nominal
SCP_x_public	Numeric	8	2		None	None	14	Right	Nominal
SCP_x_small	Numeric	8	2		None	None	13	Right	Nominal
SCP_x_ong...	Numeric	8	2		None	None	15	Right	Nominal

In using the multiple regression method for testing the impact of moderator variable, following assumptions are maintained:

- **Assumption of the linear relationship in the outcome and independent variables**: For this assumption, the hypotheses conducted in the previous sections showed the linear relationships of the dependent and independent variables. Therefore, this assumption is valid for the following hypotheses tests as well for moderator relationships.
- **Multivariate Normality**: The normal distribution of residuals is also assumed since the analysis of variance in previous sections provided evidence for this normal distribution of residuals
- **No Multicollinearity:** Since the multiple regression analyses performed in following pages verify the established linear relationships and no high correlation of independent variables is found, therefore, this assumption is also valid in current scenario and there is no Multicollinearity found in independent variables.

The following sections deal with the hypotheses testing of variables in presence of the moderator variables; project size and project context.

1-H5: The impact of smart planning practices (SPP) on project success is moderated by project size and project context.

H5$_0$: Project size and project context has no effect on the impact of smart planning practices (SPP) on project success.

The impact of moderator was compared in presence of independent variables with a dummy in the presence of interaction variable of independent and dummy variable. Multiple linear regressions are the model used to compare the impact of the model. Model summary after the application of multiple regressions is appeared as below:

Table 4.23: Regression Results-Moderating Variables on SPP and Projects Success Relationship

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.497[a]	.247	.205	.40470	.247	5.974	4	73	.000
2	.503[b]	.253	.178	.41148	.007	.204	3	70	.893

a. Predictors: (Constant), Ongoing, SPP, Public, small

b. Predictors: (Constant), Ongoing, SPP, Public, small, SOP_x_small, SPP_x_ongoing, SPP_x_Public

The above model summary shows that the impact of dummy variables and that of the interactions of independent variable and moderators. The SPP interaction with all three dummy variables was separately calculated. The two regression models are compared. The value of R-square showed a slight positive increase from .247 to .253. Therefore, a net change of R-square resulted as .007. This change is small but quite significant as shown in the following table of ANOVA. The F-value in both cases is more than zero and significant with values below the threshold of .05.

Table 4.24: ANOVA Results-Moderating Variables on SPP and Projects Success Relationship.

ANOVA[c]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.914	4	.978	5.974	.000[a]
	Residual	11.956	73	.164		
	Total	15.870	77			
2	Regression	4.122	7	.589	3.509	.003[b]
	Residual	11.747	70	.168		
	Total	15.870	77			

a. Predictors: (Constant), Public, SPP, Ongoing, small

b. Predictors: (Constant), Public, SPP, Ongoing, small, SPP_x_ongoing, SPP_x_Public, SPP_x_small

c. Dependent Variable: Project Success

Hence, in view of above results, the assumption that the impact of smart planning practices (SPP) on project success is moderated by project size and project context is proved due to the above-shown evidence. Hence, the hypothesis H5 is **accepted**, whereas null hypothesis $H5_0$ is **rejected**.

2-H6: The impact of smart organizing practices (SOP) on project success is moderated by project size and project context.

$H6_0$: Project size and project context has no effect on the impact of smart organizing practices (SOP) on project success.

The impact of moderator was compared in presence of independent variables SOP with a dummy of project size and context variables in the presence of interaction of independent and dummy variable. Multiple linear regressions are the model used to compare the impact of the model. Model summary after the application of multiple regressions is appeared as below:

Table 4.25: Regression Results-Moderating Variables on SOP and Projects Success Relationship

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.607[a]	.369	.334	.37041	.369	10.666	4	73	.000
2	.637[b]	.406	.346	.36700	.037	1.454	3	70	.235

a. Predictors: (Constant), SOP, Public, Ongoing, small

b. Predictors: (Constant), SOP, Public, Ongoing, small, SOP_x_ongoing, SOP_x_Public, SOP_x_small

The above model summary shows that the impact of dummy variables and that of the interactions of independent variable and moderators. The SOP interaction with all three dummy variables was separately calculated. The two regression models are compared. The value of R-square showed a considerable positive increase from .607 to .637. Therefore, a net change of R-square resulted as .037. This change is small but quite significant as shown in the following table of ANOVA. The F-value in both cases is more than zero and significant with values below the threshold of .05.

Table 4.26: ANOVA Results-Moderating Variables on SOP and Projects Success Relationship

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.854	4	1.463	10.666	.000[a]
	Residual	10.016	73	.137		
	Total	15.870	77			
2	Regression	6.441	7	.920	6.832	.000[b]
	Residual	9.428	70	.135		
	Total	15.870	77			

a. Predictors: (Constant), SOP, Public, Ongoing, small

b. Predictors: (Constant), SOP, Public, Ongoing, small, SOP_x_ongoing, SOP_x_Public, SOP_x_small

c. Dependent Variable: Project Success

3-H7: The impact of smart leading practices (SLP) on project success is moderated by project size and project context.

$H7_0$: Project size and project context has no effect on the impact of smart leading practices (SLP) on project success.

The impact of moderator was compared in presence of independent variables with a dummy in the presence of interaction variable of independent and dummy variable. Multiple linear regressions are the model used to compare the impact of the model. Model summary after the application of multiple regressions is appeared as below:

Table 4.27: Regression Results-Moderating Variables on SLP and Projects Success Relationship

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.523[a]	.273	.234	.39746	.273	6.865	4	73	.000
2	.533[b]	.284	.213	.40286	.011	.352	3	70	.788

a. Predictors: (Constant), SLP, small, Public, Ongoing

b. Predictors: (Constant), SLP, small, Public, Ongoing, SLP_x_public, SLP_x_ongoing, SLP_x_small

The above model summary shows that the impact of dummy variables and that of the interactions of independent variable and moderators. The SLP interaction with all three dummy variables was separately calculated. The two regression models are compared. The value of R-square showed a slight positive increase from .523 to .533. Therefore, a net change of R-square resulted as .011. This change is small but quite significant as shown in the following table of ANOVA. The F-value in both cases is more than zero and significant with values below the threshold of .05.

Table 4.28: ANOVA Results-Moderating Variables on SLP and Projects Success Relationship.

ANOVA[c]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.338	4	1.084	6.865	.000[a]
	Residual	11.532	73	.158		
	Total	15.870	77			
2	Regression	4.509	7	.644	3.969	.001[b]
	Residual	11.361	70	.162		
	Total	15.870	77			

a. Predictors: (Constant), SLP, small, Public, Ongoing

b. Predictors: (Constant), SLP, small, Public, Ongoing, SLP_x_public, SLP_x_ongoing, SLP_x_small

c. Dependent Variable: Project Success

In above ANOVA table, F-value is changed from 6.865 to 3.969, thus the impact of moderators has changed the magnitude of the relationship between SLP and Project success in a significant manner. Hence, in view of above results, the assumption that the impact of smart leading practices (SLP) on project success is moderated by project size and project context is proved due to the above-shown evidence. Hence, the hypothesis H7 is **accepted**, whereas null hypothesis $H7_0$ is **rejected**.

4-H8: The impact of smart controlling practices (SCP) on project success is moderated by project size and project context.

$H8_0$: Project size and project context has no effect on the impact of smart controlling practices (SCP) on project success.

The impact of moderator was compared in presence of independent variables with a dummy in the presence of interaction variable of independent and dummy variable. Multiple linear regressions are the model used to compare the impact of the model. Model summary after the application of multiple regressions is appeared as below in table 4.28

The above model summary shows that the impact of dummy variables and that of the interactions of independent variable and moderators. The SCP interaction with all three dummy variables was separately calculated. The two regression models are compared. The value of R-0square showed a considerable positive increase from .284 to .320. Therefore, a net change of R-square resulted as .036. This change is small but quite significant as shown in the following table of ANOVA. The F-value in both cases is more than zero and significant with values below the threshold of .05.

Table 4.29: Regression Results-Moderating Variables on SCP and Projects Success Relationship

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.533[a]	.284	.244	.39472	.284	7.125	4	72	.000
2	.565[b]	.320	.250	.39296	.036	1.215	3	69	.311

a. Predictors: (Constant), SCP, Public, Ongoing, small-

b. Predictors: (Constant), SCP, Public, Ongoing, small, SCP_x_ongoing, SCP_x_public, SCP_x_small

In the ANOVA table below, F-value is changed from 7.125 to 4.629, thus the impact of moderators has changed the magnitude of the relationship between SCP and Project success in a significant manner. Hence, in view of above results, the assumption that the impact of smart controlling practices (SCP) on project success is moderated by project size and project context is proved due to the above-shown evidence. Hence, the hypothesis H8 is **accepted**, whereas null hypothesis $H8_0$ is **rejected**.

Table 4.30: ANOVA Results-Moderating Variables on SCP and Projects Success Relationship

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.440	4	1.110	7.125	.000[a]
	Residual	11.218	72	.156		
	Total	15.658	76			
2	Regression	5.003	7	.715	4.629	.000[b]
	Residual	10.655	69	.154		
	Total	15.658	76			

a. Predictors: (Constant), SCP, Public, Ongoing, small

b. Predictors: (Constant), SCP, Public, Ongoing, small, SCP_x_ongoing, SCP_x_public, SCP_x_small

c. Dependent Variable: Project Success

4.3 Qualitative Data Analysis

The last two questions of the survey are linked with additional practices and new success factors in the projects of respondents which are not mentioned in the items of this research questionnaire. The reason for adding these questions is to retrieve the input of respondent’s real-life practices and ground realities of the projects beyond the factors discussed in theory or in previous researches. The analysis of responses to these questions is as follows:

4.3.1 The other smart practices in smart city projects

In response to this question, multiple responses were retrieved. According to one respondent, communication is a key practice that linked with the success of the project. In view of this comment, it is not the practice itself but more the availability of a grand vision and how and who the project benefits, plus early concrete results so that those who are involved in the project can see that progress is being made. This gives project team the feeling that they are going in the right direction. Another respondent added that use of correct of-the-shelf solutions, use an appropriate SC platform adapted to the kind of SC project, policy alignment of the public servants, use of Standards like UNE178. Therefore, the practices beyond the articulate principles and regulations are also required in view of the changes in the specific environment of the project.

Moreover, the other essential elements identified by these respondents are continuous citizen participation, well-defined business objectives, ethical and sustainable responsibility and modes of successful procurement. These practices demand a thorough understanding of social and environmental laws and restrictions to undertake the processes on the project. However, the implementation of evaluation framework is also considered to have a viable importance in project success.

The other aspects identified by these respondents are related to the advancement in technology that facilitated the communication, design and procedures on projects. According to one respondent, “human-centric digital services and customer segmentation to generate business case and route to ROI” are important concerns in smart cities projects. Another viewpoint expressed as the collaboration between citizens, governments and local public administrations as an important element in designing and implementation of smart cities projects. The respondents also pointed towards the importance of the role of government in fulfilling the smarty cities projects by saying, “Awareness in Public for Smart city components should be made or given by government”. Thus, the perception of respondents involved the active role of governments as well.

4.3.2 The other key success factors in smart cities

A mixed response of positive and negative comments is received for this question. According to one respondent, the provided list of success factors was exhausted since “In the reality while all of the criteria are important, NOT all will be met. Smart city projects will encounter numerous problems that no one has anticipated.” Though many success factors given in the questionnaire are not achieved in real life projects, one respondent wrote that “My answers are what I think are desirable but if truth is to be told, many of them cannot be achieved all at the same time.” In view of another subject of this research, “Attitude change of households is important, mainly understanding those households are in control of their energy and their environment. Households are now just victims of city’s policies, where they should be an active participant in the process of changing environment and energy management”.

Other important success factors referred by these respondents included the making of a benefits realization plan, monitoring and evaluation to assure the service deliveries and capacity building of officials as well as citizens. However, people are normally observed to become active during the development of a smart cities project. Moreover, proper planning importance was also realized by these respondents, since one commented that planning is not only important initial stage which makes the development smart, it is also primary aspect throughout the project. Also, companies should not only focus on latest IT & Technology, its overall plan incorporating local and environmental concern addressing all the utilities. In addition, some respondent pointed out that even if the project is not completed, ensuring trust between stakeholders when working with citizens, make sure they get something in return can have a good impact on community building.

Therefore, the above qualitative analysis showed that the proper communication, easiness of process and proper handling of human resource are some key success factors that need management commitment and complete participation of employees. Also, data access and key technologies are the key metrics for improving a smart city.

4.4 Summary of The Data Analysis and Interpretation

This section presented the findings of the research in addition to the analysis of the collected data. The reliability of the questionnaire was analyzed briefly, then the research instrument and the hypotheses were tested using linear regression method and ANOVA tests. Pearson coefficient of correlation was measured using SPSS to confirm the correlation between dependent and independent variables. Moreover, Qualitative data analysis was conducted to identify other smart practices and success criteria. Chapter 5 will introduce the discussion of the findings, implications, limitations of the study, suggestions for future research and conclusions.

5. FINDINGS, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSIONS

5.1 Introduction

This chapter includes discussion of the findings from the statistical analysis in the previous chapter. It also draws the relevant conclusions from both theoretical and empirical results and findings. Most importantly, a holistic framework will be proposed for smart city projects management and proposed managerial implications will be argued. Finally, it presents the limitations of the research, besides some recommendations for future research.

5.2 Discussion of the Findings

This section discusses the statistical analysis and finding reported in chapter 4. The purpose of the study was to know whether there is a relationship between the smart project practices and the smart city project efficiency and effectiveness. Another purpose is to identify the smart practices and the smart success criteria. This enables the research community and smart city projects professionals to use the information they need in order to increase project success and minimize project failures rates. Finally, based on this, a smart framework for smart city projects management was developed. To prove the efficiency and application of the framework developed for this study, several hypotheses related to the framework were tested. The two main research questions proposed in chapter one are answered in this chapter. These questions are:

RQ1: How to run smart city projects efficiently and effectively in Europe?

RQ2: How do smart project management practices influence the project success in Europe?

To answer question 1 a conceptual framework for examining the smart practices that affect the smart city projects success has been described. The framework suggests that smart city projects success is influenced by smart management (i.e., Smart planning, Smart organizing, Smart leading and Smart controlling). In turn, each smart management factor includes several practices (i.e. Clear project goals, support of all stakeholders, collaboration among project teams, etc.). The framework was tested through the analysis of the relationship between key variables related to the planning, organizing, leading, controlling and project success. These latent variables have several indicators or factors that are measured and tested through different assessments scales. The relationship between the different variables through their specific factors confirms the framework for smart city projects management. Moreover, a combination of 8 hypotheses was used to describe and define the framework for smart city projects management. To answer question 2 all the variables were tested for significant correlations. The results obtained provide a good understanding of the importance of smart management practices that affect the success of smart city projects.

As demonstrated by the results in chapter 4, the questionnaire, being online, was available in all parts of Europe. This clearly indicates that the results, analysis and conclusions formed during this study involved entire Europe and not a specific location. Over three-quarters of the respondents have around 1-5 years of experience in smart city projects. Another evident feature is a large proportion of missing values so that only 39% answered the full questionnaire. This is an indication that knowledge and practice regarding the management of smart city projects have not been reached to the maximum. Thus, more research in this area is encouraged to gain more knowledge concerning smart cities project management.

In terms of Smart Management Practices, 4 variables were tested. These include Smart Planning Practices, Smart Organization Practices, Smart Leading Practices and Smart Controlling Practices. The influence of each Smart Management Practice on the project outcome was identified using correlation and regression analysis from the gathered data. The study found that there is a positive correlation between these smart practices and project success. The results of the data analysis indicate the main Smart Management practices for effective and smart planning, organizing, leading and controlling. When organizations implement these practices, they can improve the success of the smart city projects significantly. Identifying these Smart Practices help the project managers to focus their effort on the appropriate practice to get the desired outcome. Consequently, improving the poorly performed tasks or processes and improving/increasing the chance of project success.

Smart planning practices

The study identifies 10 influential/most important Smart planning practices that affect project success. The majority of respondent 88% agreed that the projects should have a clear strategy and deliverable objectives, 75% coincided that the project's stakeholders and the local government should support the project and involve users in the project, 76% corresponded that benefits for stakeholders should be defined at the project start-up, 68% agreed that the project risk should be identified and managed, and project management method and business model is defined. Other practices as the reliance of project on ICT the respondents were neutral about them.

Smart organizing practices

The study identifies 4 important Smart organizing practices that affect project success. 90% of the respondents agreed that team responsibilities should be clarified, 77% concurred with defining the project structure and activities, 66 % answered the collaboration between private and public sectors increases the project success, where the use of innovative funding and branding for the smart city were less important factors.

Smart leading practices

Eight important Smart leading Practices affecting the project success were identified. Most of the respondents 90% agreed on the positive effect of communication, collaboration and knowledge sharing among smart city project team members and stakeholders, 80% corresponded that the appropriate project manager should be assigned where 70% agreed on the importance of team member's experience and tanning and taking advantage of the past projects experience whether they failed or succeeded. Other factors such as defining the leadership style and adopting change management practices were also important for 60% of respondent’s agreement answers.

Smart controlling practices

The study identified three important Smart Controlling practices which affects the project success. Most of the respondents agreed that the continuous R&D, knowledge exchange and KPI’s measurement can lead to project success.

Moreover, the study meant to identify the Smart success criteria for smart city projects by applying the classical project success factors and adding special (smart) factors for smart city projects. The finding indicates that sustainability and created value whether it’s a positive impact on people, environment, knowledge and economy can be indicators of project success where 90% of the respondents agreed on this. It’s important to note the classical indicators in terms of quality, time and cost can be applicable to smart city projects but are not enough to indicate whether the smart city project is successful.

The other work done in this study is investigating the effect of project size and context on the relationship between the Smart Management Practices and project success. It’s worthy to note that most smart city projects are on-going, medium size and joint projects (PPP). The results show that project size and context have a significant positive impact on the relationship between the Smart Management Practices and project success as hypothesized. The results demonstrate clearly that the way project managers are managing the smart city project is influenced by how large or how small the project size or the project context.

Furthermore, the study included two questions which are linked with additional practices and new success criteria in the smart city projects. The reason for adding these questions is to retrieve the input of respondent’s real-life practices and ground realities of the projects beyond the factors discussed in theory or in previous research. Therefore, a qualitative analysis was conducted and the results ascertained the list of practices and factors developed in this research. Even though other practices were identified, they weren’t generalizable to the study because they described individual’s opinions.

Finally, one of the aims of this study is exploring the gaps in knowledge and attempt to fill those gaps. In this research, the literature review surveyed the general practices in smart city projects, the success factors and the associated research on this topic. Smart city concept, frameworks, project success criteria and some supporting theories are discussed. This review clarifies that the existed frameworks have a general view of the smart city or they discuss the smart city strategy. This study interconnects the smart city concept and project management perspective and develops a framework based on that, therefore, it approaches the smart city concept from a unique angle.

5.3 Implications for Research

This section introduces suggestions about the applicability of the results of this study. These implications are divided into two main categories, theoretical and practical. As to the theoretical contributions, the study framework is a combination between the project management perspective and the smart city concept which provides a fresh view for smart city projects and defines new various factors that can potentially influence the success of smart city projects. Regarding the practical contributions, the study framework integrates the available knowledge on smart city projects and the research new findings which can provide guidance to organizations and professionals who work in smart city projects. The Smart City Project Management Framework is shown in figure 5.1 below.

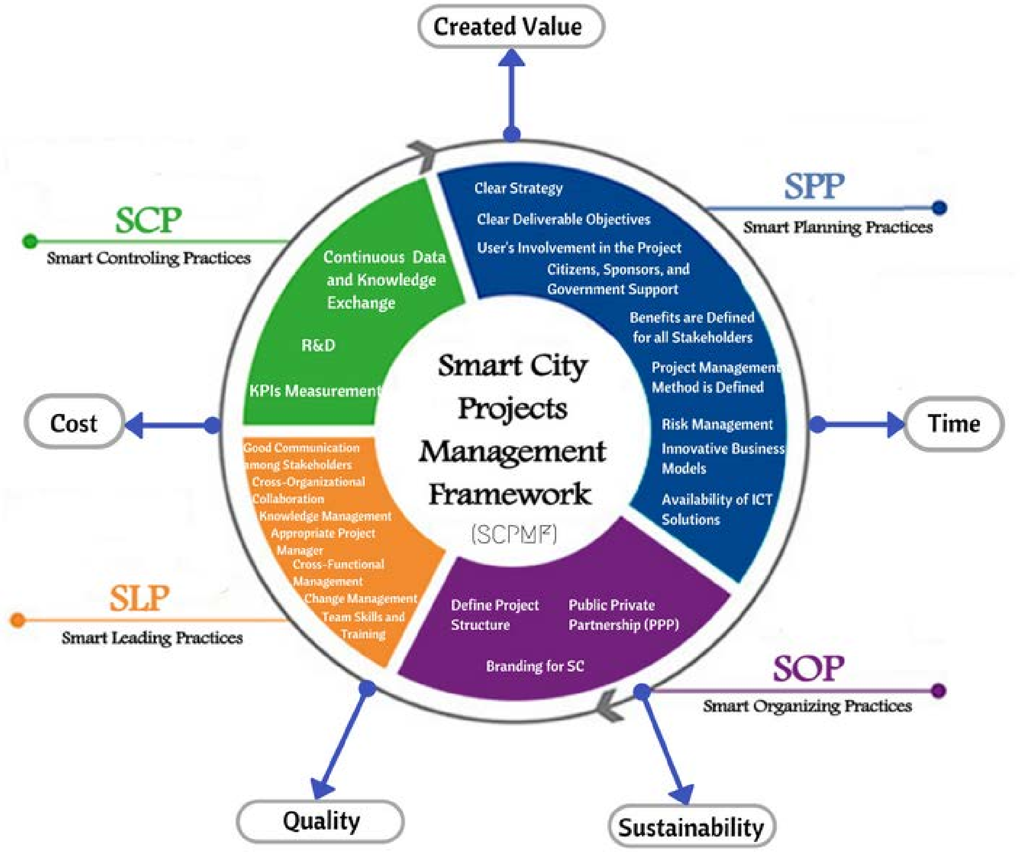


Figure 5.1: The Smart City Projects Management Framework (SCPMF)

In summary, this research reinforces the existed knowledge about smart city projects management field and may catalyze project management professionals to adopt smart practices, specifically at the start-up phase of the project lifecycle which will decrease the probability of project failures.

5.4 Recommendations for Action

Chapter 4 presented the study finding which provides a solid evidence that strong positive correlations exist between the Smart management practices and aspects of project management effectiveness, efficiency and the project success. Based on these findings, smart city projects professionals may wish to ensure that projects are not subjected to unrealistic targets and deadlines. Also, projects are regularly evaluated to guarantee their success. Furthermore, the findings implied the importance of having strong experienced smart city project managers to define clear project goals and benefits at the initiation phase. Projects managers/leaders ensure that stakeholders realize the project goals and the project team members are fully aware of their roles and committed to achieving the project objectives. Furthermore, communication and collaboration among team members are important to come up with innovative solutions. Also, the continuous R&D and knowledge sharing are encouraged to learn from the previous project's experiences.

The results will be published and accessible especially for participants in this study who were enthusiastic about its findings. Finally, Smart cities around the world need to develop new operating models that drive innovation and collaboration across the vertical silos.

5.5 Limitations of Study

This section outlines the limitations encountered during the conduct of the study, as well as, it highlights the extent to which its results might be applicable within the smart city project management area.

First of all, the smart city concept is quite new, therefore only a little research is available especially in the literature concerning smart city projects management. As a result, this allowed to explore many different aspects of the smart city concept, however, the lack of peer-reviewed research may possibly have minimized the identified factors under which the framework functioned.

Second, the scope of study involves the identification of smart practices for smart city projects implementation in Europe. Therefore, the generalization that arose from the research had to be limited to the context of Europe. Furthermore, there were missing data because of unanswered questions. Missing data were a consequence of the fact that many professionals didn't have the sufficient knowledge to answer each aspect since this study context is fairly new. Finally, in the research methodology, convenience sampling was chosen so there might be a possibility of sampling bias that can detract from the quality of this research. Therefore, the generalizability of this study is within the population who was willing to participate in it and other population with the characteristics of this study population.

5.6 Suggestions for Further Research

The smart city concept includes many research areas that can be further investigated from many perspectives. This research focused on the management and organizational aspects. Thus, it opens possibilities for further research in this area.

First, the proposed conceptual framework in this thesis can be empirically validated. Further development for the suggested framework may be added by empirically validating the smart practices that have a major effect on the success of smart city projects. Also, practical testing of the conceptual framework will be beneficial in understanding the value that project managers and other professionals should place on different characteristics in promoting the smart project practices. The second avenue of research is to identify additional factors that may influence project success. Also, specific studies should be undertaken to develop smart city projects success indicators. Moreover, each smart practice can be examined individually taken into account the uniqueness of each city and project to create an integrated guide for these projects. For example, what type of leadership should be adopted for project success? What skills should smart city managers have? etc. Another interesting research can be comparing the classical project management frameworks with smart city ones. Finally, since this thesis scope included European smart cities only, other smart cities on a global level should be examined and contrasted with European smart cities to gain knowledge how these cities approach the concept of smart cities projects management and develop similar frameworks which can be applied for these cities. Further, it's important to conduct a research for identifying barriers to smart city implementation in developing countries.

5.7 Conclusion

Smart city projects sound really attractive for a city, yet they can bring a lot of challenges to their development and management. The main research questions of this study were "How to run smart city projects efficiently and effectively in

Europe?” and “How smart project management practices influence the project success in Europe?”.

To answer these questions, a combination of the theoretical and empirical study was conducted.

First, the theoretical section outlined the relevant literature about the smart city concept. Several frameworks for smart city analysis and benchmarking were presented. Some of these frameworks are general ones that include different dimensions such as technology, legal, social, economy, etc. where others focused on the smart city strategy. Other researchers combined the smart city concepts with other theories to come up with unique aspects of the smart city research such as Ricciardi’s SC-IC framework. Further, the study included the approaches for defining the smart city projects and identified the challenges and the success factors for smart city projects management. It's important to note that the lack of available studies approaching the smart city concept from a managerial perspective justifies this study objective.

Second, a framework for Smart management practices and projects success criteria was built on the literature’s findings. This framework consists of two parts. The first one includes the management functions which are planning, organizing, leading and controlling. Each function includes smart practices which can affect the project success.

The second part of the framework includes the smart success criteria for projects. In other words, indicators for smart city projects success. The above-mentioned practices and criteria were identified from the combination of classical project management studies and the smart city research.

Subsequently, to test the framework and the research hypotheses survey data was used in the empirical section to explore the critical smart success on project success using quantitative methods. The questionnaire was sent to managers, leaders and professionals who work in smart city projects in different sectors in Europe.

The quantitative study findings backed up the research hypotheses and elucidated that a significant positive relationship does exist between Smart project practices and project success.

Finally, based on the analysis, the proposed conceptual framework can be generalized in the European context setting out a holistic view of smart city projects management.

In conclusion, this study had contributed a small step into a deeper understanding of smart city projects management.

REFERENCES

Abdoullaev, A. (2011). A Smart World : A Development Model for Intelligent Cities. *The 11th IEEE International Conference on Computer and Information Technology (CIT-2011)*, 1–28. Retrieved from http://www.cs.ucy.ac.cy/CIT2011/files/SMARTWORLD.pdf

Achaerandio, R., Bigliani, R., Curto, J., & Gallotti, G. (2012). Smart Cities Analysis in Spain 2012–*The Smart Journey. IDC. Available at: http://www.portalidc.com/resources/white_papers/IDC_Smart_City_Analysis_Spain_EN. pdf (visited 25 July 2013).*

Albino, V., **Berardi, U.**, & **Dangelico, R. M.** (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology*, *22*(1), 1–19. https://doi.org/10.1080/10630732.2014.942092.

Anthopoulos, L. G., Ipsilantis, P., & Kazantzi, V. (2016). The project management perspective for a digital city. In Project Management: Concepts, Methodologies, Tools, and Applications (pp. 793-811). IGI Global.

Allwinkle, S., & **Cruickshank, P.** (2011). Creating smart-er cities: An overview. *Journal of Urban Technology*, *18*(2), 1–16. https://doi.org/10.1080/10630732.2011.601103.

Andrews, D, Nonnecke, B & Preece, J. (2003). 'Electronic survey methodology: A case study in reaching hard-to-involve Internet users', *International Journal of Human-Computer Interaction, vol. 16, no. 2,* p. 185-210.

Angelidou, M. (2015). Smart cities: A conjuncture of four forces. *Cities*, *47*, 95–106. https://doi.org/10.1016/j.cities.2015.05.004.

Angelidou, M. (2017). The role of smart city characteristics in the plans of fifteen cities. *Journal of Urban Technology*, *24*(4), 3-28.

Anthopoulos, L., & **Fitsilis, P.** (2010). From digital to ubiquitous cities: Defining a common architecture for urban development. In *Proceedings - 2010 6th International Conference on Intelligent Environments, IE 2010* (pp. 301–306). https://doi.org/10.1109/IE.2010.61

Anthopoulos, L. G., **Ipsilantis, P.**, & **Kazantzi, V.** (2014). The Project Management Perspective for a Digital City, 1–21. https://doi.org/10.4018/IJITPM.

Aoun, C. (2013). The Smart City Cornerstone: Urban Efficiency. *Schneider Electric WhitePaper*.Retrievedfrom http://www.digital21.gov.hk/chi/relatedDoc/download/2013/079 SchneiderElectric (Annex).pdf

Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management*, *17*(6), 337–342. https://doi.org/10.1016/S0263-7863(98)00069-6

Bakici, T., **Almirall, E.**, & **Wareham, J.** (2013). A Smart City Initiative: The Case of Barcelona. *Journal of the Knowledge Economy*, *4*(2), 135–148. https://doi.org/10.1007/s13132-012-0084-9

Barrionuevo, J. M., **Berrone, P.**, & **Ricart, J. E.** (2012). Smart Cities, Sustainable Progress. *EXPERT Insight*, (14), 50–57. Retrieved from http://www.iese.edu/en/files/Smart cities sustainable progress_tcm4-87325.pdf

Bell, E., & Bryman, A. (2007). The ethics of management research: an exploratory content analysis. British Journal of Management, 18(1), 63-77.

Ben Letaifa, S. (2015). How to strategize smart cities: Revealing the SMART model. *Journal of Business Research*, *68*(7), 1414–1419. https://doi.org/10.1016/j.jbusres.2015.01.024.

Benefits Realization Management Framework | PMI.(2016). Pmi.org. Retrieved 25 January 2018, from https://www.pmi.org/learning/thought-leadership/series/benefits-realization/benefits-realization-management-framework.

Berardi, U. (2013). Sustainability assessment of urban communities through rating systems. *Environment, Development and Sustainability*, *15*(6), 1573–1591. https://doi.org/10.1007/s10668-013-9462-0

Borcuch, A., & **Piłat-Borcuch, M.** (2016). The Importance of Selected Factors in Smart City Development: The Student's Perspective, *2*(6), 604–611.

BSI. (2014). *Smart City Framework – Guide to establishing strategies for smart cities and communities. Report. The British Standard Institution*.

Campbell, T. (2013). *Beyond smart cities: How cities network, learn and innovate. Beyond Smart Cities: How Cities Network, Learn and Innovate*. https://doi.org/10.4324/9780203137680

Caragliu, A., **del Bo, C.**, & **Nijkamp, P.** (2011). Smart cities in Europe. *Journal of Urban Technology*, *18*(2), 65–82. https://doi.org/10.1080/10630732.2011.601117.

Capra, C. F. (2016). The Smart City and its Citizens: Governance and Citizen Participation in Amsterdam Smart City. International Journal of E-Planning Research (IJEPR), 5(1), 20-38.

Chourabi, H., **Nam, T.**, **Walker, S.**, **Gil-Garcia, J. R.**, **Mellouli, S.**, **Nahon, K.**, … **Scholl, H. J.** (2012a). Understanding smart cities: An integrative framework. In *Proceedings of the Annual Hawaii International Conference on System Sciences* (pp. 2289–2297). https://doi.org/10.1109/HICSS.2012.615

Chourabi, H., **Nam, T.**, **Walker, S.**, **Gil-Garcia, J. R.**, **Mellouli, S.**, **Nahon, K.**, … **Scholl, H. J.** (2012b). Understanding smart cities: An integrative framework. *Proceedings of the Annual Hawaii International Conference on System Sciences,* (June 2015), 2289–2297. https://doi.org/10.1109/HICSS.2012.615.

Climate Action Plan Strategies & Resources.(December 12, 2013). [City of Boulder Colorado web portal]. Retrieved from: https://bouldercolorado.gov/pages/climate-action-plan-strategies-resources.

Cohen, B. (2011). Smart cities wheel. Retrieved February, 26, 2018.

Colldahl, C., **Frey, S.**, & **Kelemen, J. E.** (2013). Smart Cities : Strategic Sustainable Development for an Urban World, 63.

Cousins, A. (n.d.). Greentech in the City Whitepaper.

Creswell, J. (2012). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches - John W. Creswell - Google Books. SAGE publications*. Retrieved from https://books.google.ca/books/about/Qualitative_Inquiry_and_Research_Design.html?id=OJYEbDtkxq8C&hl=en

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed method*. *Research design Qualitative quantitative and mixed methods approaches*. https://doi.org/10.1007/s13398-014-0173-7.2

Cardullo, P., & Kitchin, R. (2017). Being a 'citizen'in the smart city: Up and down the scaffold of smart citizen participation.

Cugurullo, F. (2013). The Business of Utopia : Estidama and the Road to the Sustainable City. *Utopian Studies*, *24*(1), 66–88. https://doi.org/10.1353/utp.2013.0008

Dameri, R. P., & **Ricciardi, F.** (2015). Journal of Intellectual Capital Smart city intellectual capital: an emerging view of territorial systems innovation management Smart city intellectual capital: an emerging view of territorial systems innovation management. *Journal of Intellectual Capital Journal of Intellectual Capital Iss Journal of Strategy and Management Iss*, *16*(3), 860–887. Retrieved from http://dx.doi.org/10.1108/JIC-02-2015-0018%5Cnhttp://dx.doi.org/10.1108/JIC-03-2015-0027%5Cnhttp://dx.doi.org/10.1108/JSMA-03-2015-0030

Dameri, R. P., & **Ricciardi, F.** (2015). Smart city intellectual capital: an emerging view of territorial systems innovation management. *Journal of Intellectual Capital*, *16*(4), 860–887. https://doi.org/10.1108/JIC-02-2015-0018

Dameri, R. P., & **Rosenthal-Sabroux, C.** (2014). Smart City and Value Creation. In *Smart City: How to Create Public and Economic Value with High Technology in Urban Space* (pp. 1–12). https://doi.org/10.1007/978-3-319-06160-3_1

Denscombe, M. (2007) The good research guide: for small-scale social research projects. 3rd edn. Available at: http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S97803352 29680 Maidenhead: Open University Press viewed18 July 2013

Desouza, K. C., & **Flanery, T. H.** (2013). Designing, planning, and managing resilient cities: A conceptual framework. *Cities*, *35*, 89–99. https://doi.org/10.1016/j.cities.2013.06.003.

Dewalska–Opitek, A. (2014, October). Smart city concept–the citizens' perspective. In International Conference on Transport Systems Telematics (pp. 331-340). Springer, Berlin, Heidelberg.

Doukas, C., **Metsis, V.**, **Becker, E.**, **Le, Z.**, **Makedon, F.**, & **Maglogiannis, I.** (2011). Digital cities of the future: Extending @home assistive technologies for the elderly and the disabled. *Telematics and Informatics*, *28*(3), 176–190. https://doi.org/10.1016/j.tele.2010.08.001

EC, (n.a.). (2007). Smart cities: ranking of European mid-sized cities. *Digital Agenda for Europe*, (October), 28. https://doi.org/10.1016/S0264-2751(98)00050-X.

Ilker Etikan, Sulaiman Abubakar Musa, Rukayya Sunusi Alkassim. Comparison of Convenience Sampling and Purposive Sampling. American Journal of Theoretical and Applied Statistics. Vol. 5, No. 1, 2016, pp. 1-4. doi: 10.11648/j.ajtas.20160501.11

Fleischmann, A., **Fleischmann, A.**, & **Fleischmann, A.** (2015). systems Society requirements and acceptance of the smart city programs Final review.

Frost & Sullivan's study on "Strategic Opportunity Analysis of the Global Smart City Market" published in 2013.

Gale, N. K., **Heath, G.**, **Cameron, E.**, **Rashid, S.**, & **Redwood, S.** (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, *13*(1). https://doi.org/10.1186/1471-2288-13-117.

Gay, L. R., & Airasian, P, (2000). Educational research (6th ed.). Columbus, Ohio: Prentice Hall.

Giffinger, R. (2007). Smart cities Ranking of European medium-sized cities. *October*, *16*(October), 13–18. https://doi.org/10.1016/S0264-2751(98)00050-X

Gil-García, J. R., & **Pardo, T. A.** (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Government Information Quarterly*. https://doi.org/10.1016/j.giq.2005.02.001.

Gleeson, B. and Low, N. (2000) 'Cities as consumers of worlds environment', in N. Low, B. Gleeson, I. Elander and R. Lidskog (eds.) Consuming Cities: The Urban Environment in the Global Economy after the Rio Declaration, pp. 1–29. London: Routledge.

Grand View Research Inc, (2018) *Smart Cities Market Size Worth $2.57 Trillion By 2025 | CAGR: 18.4%*. (2018). *Grandviewresearch.com*. Retrieved 22 April 2018, from https://www.grandviewresearch.com/press-release/global-smart-cities-market

Growth, A. T. (n.d.). Global Smart City Market By Mani James.

Hajduk, S. (2016). The Concept of a Smart City in Urban Management. *Business, Management and Education*, *14*(1), 34–49. https://doi.org/10.3846/bme.2016.319

HAJDUK, S. (2016). THE CONCEPT OF A SMART CITY IN URBAN MANAGEMENT. *Business, Management & Education / Verslas, Vadyba Ir Studijos*, *14*(1), 34–49. https://doi.org/10.3846/bme.2016.319

Harms, J. R. (2016a). Critical Success Factors for a Smart City Strategy. In *25th Twente Student Conference on IT* (pp. 1–8).

Harms, J. R. (2016b). Critical Success Factors for a Smart City Strategy. *25th Twente Student Conference on IT*, 1–8.

Harrison, C., **Eckman, B.**, **Hamilton, R.**, **Hartswick, P.**, **Kalagnanam, J.**, **Paraszczak, J.**, & **Williams, P.** (2010). Foundations for Smarter Cities. *IBM Journal of Research and Development*, *54*(4), 1–16. https://doi.org/10.1147/JRD.2010.2048257.

Hartemink, N. A. (2016). Governance Processes in Smart City Initiatives: Exploring the implementation of two Dutch Smart City Projects: TRANSFORM-Amsterdam and TRIANGULUM-Eindhoven.

Harms, J. R. (2016, July). Critical Success Factors for a Smart City Strategy. In Proceedings of 25th Student Conference on IT (July 1, 2016).

Helfert, M., **Krempels, K. H.**, **Klein, C.**, **Donnellan, B.**, & **Gusikhin, O.** (2015). Smart cities, green technologies, and intelligent transport systems: 4th international conference, SMARTGREENS 2015 and 1st international conference VEHITS 2015 Lisbon, Portugal, May 20???22, 2015 revised selected papers. *Communications in Computer and Information Science*, *579*, 17–31. https://doi.org/10.1007/978-3-319-27753-0.

Heuser, L. and Fleischmann, A. (2015). Investigation of the future smart city concepts, technologies and systems. Society requirements and acceptance of the smart city programs. [online] SMARTPOLIS. Available at: http://smartpolis.eit.bme.hu/sites/default/files/D3.1_Soc.%20req.%20and%20acceptance%20of%20the%20smart%20city%20programs.pdf [Accessed 26 Feb. 2018].

Hollands, R. G. (2008). Will the real smart city please stand up? *City*, *12*(3), 303–320. https://doi.org/10.1080/13604810802479126.

Huovila, A., **Airaksinen, M.**, **Pinto-Seppä, I.**, **Piira, K.**, **Bosch, P.**, **Penttinen, T.**, … **Kontinakis, N.** (2017). CITYkeys Smart City Performance Measurement System. *Journal of Housing Science*, *41*(2), 113–125.

IBM (2010). Smarter thinking for a smarter planet.

International Organization for Migration. (2015). Irregular Migrant, Refugee Arrivals in Europe Top One Million in 2015: IOM. [Online] Available at: https://www.iom.int/news/irregular-migrant-refugee-arrivals-europe-top-one-million-2015-iom [Accessed 26 Feb. 2018].

Ishida, T. (2002). Digital city Kyoto. *Communications of the ACM*, *45*(7), 76–81. https://doi.org/10.1145/514236.514238.

Israel, Glenn D. (1992). Sampling The Evidence Of Extension Program Impact. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-5. October.

ITU-T FG-SSC TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU ITU-T Focus Group on Smart Sustainable; Cities Smart sustainable cities: An analysis of definitions, 2014.

J.H. Lee, M.G. Hancock, and M. Hu, Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco, Technological Forecasting and Social Change, in press, 2013.

Lee, J. H., & Hancock, M. G. (2012). Toward a framework for smart cities: A comparison of Seoul, San Francisco and Amsterdam. INNOVATIONS FOR SMART GREEN CITIES: WHAT'S WORKING, WHAT'S NOT, WHAT'S NEXT? Oberndorf Event Center, 26-27.

Johnson, B., & Christensen, L. (2008). Educational research: Quantitative, qualitative, and mixed approaches. Sage.

Joppe, M. (2000). The Research Process.

Joshi, S., **Saxena, S.**, **Godbole, T.**, & **Shreya**. (2016a). Developing Smart Cities: An Integrated Framework. In *Procedia Computer Science* (Vol. 93, pp. 902–909). https://doi.org/10.1016/j.procs.2016.07.258

Joshi, S., **Saxena, S.**, **Godbole, T.**, & **Shreya**. (2016b). Developing Smart Cities: An Integrated Framework. *Procedia Computer Science*, *93*(September), 902–909. https://doi.org/10.1016/j.procs.2016.07.258

Kehoe, M., **Cosgrove, M.**, **De Gennaro, S.**, **Harrison, C.**, **Harthoorn, W.**, **Hogan, J.**, … **Peters, C.** (2011). Smarter Cities Series: A Foundation for Understanding IBM Smarter Cities. *IBM Redguides for Business Leaders*, 1–30. https://doi.org/10.1147/JRD.2010.2048257

Khan, Z., **Dambruch, J.**, **Peters-Anders, J.**, **Sackl, A.**, **Strasser, A.**, **Fröhlich, P.**, … **Soomro, K.** (2017). Developing knowledge-based citizen participation platform to support smart city decision making: The smarticipate case study. *Information (Switzerland)*, *8*(2). https://doi.org/10.3390/info8020047

Kitchin, R. (2014). The real-time city? Big data and smart urbanism. *GeoJournal*, *79*(1), 1–14. https://doi.org/10.1007/s10708-013-9516-8.

Kogan, N., & **Lee, K. J.** (2014). Exploratory Research on the Success Factors and

Challenges of Smart City Projects. *Asia Pacific Journal of Information Systems*, *24*(2), 141–189. https://doi.org/10.14329/apjis.2014.24.2.141

Kourtit, K., **Macharis, C.**, & **Nijkamp, P.** (2014). A multi-actor multi-criteria analysis of the performance of global cities. *Applied Geography*, *49*, 24–36. https://doi.org/10.1016/j.apgeog.2013.09.006

Lee, J. H., **Hancock, M. G.**, & **Hu, M. C.** (2014). Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco. *Technological Forecasting and Social Change*, *89*, 80–99. https://doi.org/10.1016/j.techfore.2013.08.033

Lee, J. H., **Phaal, R.**, & **Lee, S. H.** (2013). An integrated service-device-technology roadmap for smart city development. *Technological Forecasting and Social Change*, *80*(2), 286–306. https://doi.org/10.1016/j.techfore.2012.09.020.

Lee Y. (2013) . Ubiquitous (Smart) City. Proceedings of EU Parliament Seminar on Smart (Ubiquitous) City Consortium, p.3.

Leedy, P. D., & Ormond, J. E. (2001). Planning and design: Practical research.

Leydesdorff, L., & **Deakin, M.** (2011). The triple-helix model of smart cities: A neo-evolutionary perspective. *Journal of Urban Technology*, *18*(2), 53–63. https://doi.org/10.1080/10630732.2011.601111

Lindskog, H. (2004). Smart communities initiatives. *Proceedings of the 3rd ISOneWorld Conference*, (April), 16.

Liu, P., & **Peng, Z.** (2014). China's smart city pilots: A progress report. *Computer*. https://doi.org/10.1109/MC.2013.149

Lombardi, P., **Giordano, S.**, **Farouh, H.**, & **Yousef, W.** (2012). Modelling the smart city performance. *Innovation*. https://doi.org/10.1080/13511610.2012.660325.

Management of Urban Infrastructures – part 1. (n.d.). Retrieved February 26, 2018, from https://www.coursera.org/learn/managing-urban-infrastructures-1Market."[Online]. http://www.frost.com/sublib/display-report.do.

Manville, C., **Cochrane, G.**, **Cave, J.**, **Millard, J.**, **Pederson, J. K.**, **Thaarup, R. K.**, … **Kotterink, B.** (2014). *Mapping smart cities in the EU. European Parliament: Policy Department, Economic and Scientific Policy*. https://doi.org/10.1007/s13398-014-0173-7.2

Meeus, L., **Delarue, E.**, **Fernandes, E. de O.**, **Leal, V.**, **Azevedo, I.**, **Glachant, J.-M.**, & **...** (2010). *Smart Cities Initiative: how to foster a quick transition towards local sustainable energy systems*. *European University Institute (EUI Working Papers)*. https://doi.org/10.2870/34539

Monzon, A. (2015a). Smart Cities and Green ICT Systems (SMARTGREENS), 2015 International Conference on. *Smart Cities and Green ICT Systems (SMARTGREENS), 2015 International Conference on*, 1–11. https://doi.org/10.1007/978-3-319-27753-0_2

Monzon, A. (2015b). Smart cities concept and challenges: Bases for the assessment of smart city projects. In *Communications in Computer and Information Science* (Vol. 579, pp. 17–31). https://doi.org/10.1007/978-3-319-27753-0_2.

Mordor Intelligence LLP, "Global Smart Cities Market - Growth, Trends and Forecasts (2014-2020)," Sep-2015. [Online]. Available: https://www.reportbuyer.com/product/3281852/global-smart-cities-market-growth-trends-and-forecasts-2014-2020.html. [Accessed: 08-Feb-2018].

Morrison, J., & Brown, C. (2004). Project management effectiveness as a construct: A conceptual study. South African Journal of Business Management, 35(4), 73-94.

Murray, A., **Minevich, M.**, & **Abdoullaev, A.** (2011). Being smart about smart cities. *KM World*, *20*(10), 20–22. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=69968948&lang=es&site=ehost-live

Nam, T., & **Pardo, T.** (2011a). Smart city as urban innovation: Focusing on management, policy, and context. *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, 185–194. https://doi.org/10.1145/2072069.2072100

Nam, T., & **Pardo, T. A.** (2011c). Conceptualizing smart city with dimensions of technology, people, and institutions. In *Proceedings of the 12th Annual International Digital Government Research Conference on Digital Government Innovation in Challenging Times - dg.o '11* (p. 282). https://doi.org/10.1145/2037556.2037602.

Nam, T., & **Pardo, T. A.** (2011d). Smart city as urban innovation. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance - ICEGOV '11* (p. 185). https://doi.org/10.1145/2072069.2072100

Navigant Research (n.d.) Smart City Tracker 1Q13: Global Smart City Projects by World Region, Market Segment, Technology, and Application. Available online at: http://www.navigantresearch.com/research/ smart-city-tracker-1q13 [Acessed 26 February 2018].

Neirotti, P. (2013). New business model in smart cities: Emerging trends and methods of analysis. Master. Politecnico di Torino.

Neuman, W. L. (2014). *Social Research Methods: Qualitative and Quantitative Approaches*. *Relevance of social research* (Vol. 8). https://doi.org/10.2307/3211488.

Nwagbogwu, D. C. (2011). The correlation between project management effectiveness and project success. Walden University.

Ojo, A., **Curry, E.**, & **Janowski, T.** (2014). *Designing Next Generation Smart City Initiatives-Harnessing Findings And Lessons From A Study Of Ten Smart City Programs*. *Twenty Seond European Conference on Information Systems*. Retrieved from http://aisel.aisnet.org/ecis2014/proceedings/track15/12/

ORGANISING Lessons from Amsterdam. (2016), (November).

Pallant, J. (2010). *SPSS survival manual: A step by step guide to data analysis using SPSS*. *Step by step guide to data analysis using the SPSS program*. Retrieved from http://solo.bodleian.ox.ac.uk/primo_library/libweb/action/search.do?dscnt=1&vl(drStartDay6)=00&vl(60606418UI3)=all_items&scp.scps=scope:(OULS),scope:(NET)&tab=local&srt=rank&mode=Advanced&vl(1UIStartWith1)=contains&tb=t&indx=1&vl(drEndYear6)=Year&vl(freeT

Pather, S., **Remenyi, D.**, & **Harpe, A. De**. (2006). Evaluating e-Commerce Success – A Case Study. *The Electronic Journal of Information Systems Evaluation*, *9*(1), 15–26. https://doi.org/10.1016/0886-1633(92)90020-C

Perevezentsev, M. (2013). Strategic Opportunity Analysis of the Global Smart City

Market. *Frost & Sullivan Mega Trends, Defining Our Future: Are You Ready?*, *8*, 1–19.

PETERS, B. and Harper, J. (2017). IBI GROUP'S TOP 10 Smart City Strategy Success Factors. [online] IBI Group. Available at: https://www.ibigroup.com/wp-content/uploads/2017/10/Smart-Cities-Bruno-White-Paper.pdf [Accessed 26 Feb. 2018].

Pfaeffli, M. P., **Rollier, R.**, **Vonlanthen, B.**, & **Wade, M.** (2016). Smart City Essentials for City Leaders. *IMD International Institute for Management Development*. Retrieved from http://documents.swisscom.com/product/1000174-Internet/Documents/Downloadcenter/imd-SmartCity-booklet-EN.pdf.

Plumb, D., **Leverman, A.**, & **McGray, R.** (2007). The learning city in a "planet of slums." *Studies in Continuing Education*, *29*(1), 37–50. https://doi.org/10.1080/01580370601146296.

PMI Body of Knowledge (PMBOK) (2008). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) - Fourth Edition. Project Management Institute.Pmi.org. (2016). Highlights | PMI Annual Report 2016. [online] Available at: https://www.pmi.org/about/annual-reports/2016/highlights [Accessed 26 Feb. 2018].

Ponting, A. (2013). High-Tech Urbanism: The Political and Economic Implications of the Smart City. *Stanfort University Thesis*, 150. Retrieved from http://urbanstudies.stanford.edu/programs/documents/Ponting-FinalThesis.pdf

Radovanovic, D. (2003), Intelligence and Lund, University of Lund, Sweden.

Rodríguez-Bolívar, M. P. (2015). *Transforming city governments for successful smart cities*. *Transforming City Governments for Successful Smart Cities*. https://doi.org/10.1007/978-3-319-03167-5

Rogerson, R. J. (1999). Quality of life and city competitiveness. *Urban Studies*, *36*(5–6), 969–985. https://doi.org/10.1080/0042098993303.

Saunders, M. L., & Lewis, P. **& Thornhill, A.**(2009). Research methods for business students, 4.

S**aunders, M., Lewis, P. and Thornhill, A.** (2012) Research Methods for Business Students. Pearson Education Ltd., Harlow.

Schelmetic, T. (2011) The rise of the first smart cities, IMT Green and Clean Journal, 20 September. Available online at: http://news.thomasnet.com/green_clean/2011/09/20/the-rise-of-the-firstsmart-cities/ [Accessed 26 February 2018].

Sekaran, U. (2003). *eBook Collection*.

Shenhar, A., & **Dvir, D.** (2007). *Reinventing Project Management - The Diamond Approach to Succesful Growth and Innovation*. *Reinventing Project Management*.

Shin, J. (2012). ICT Leadership Toward Human-centered Technology. Korea IT Times.

Sing, S., **Amarnath, A.**, & **Parrish, K.** (2013). Global Smart City Market – A $1.5 Trillion Market Opportunity by 2020. Retrieved from http://www.slideshare.net/FrostandSullivan/global-smart-city-market-a-15-trillion-market-opportunity-by-2020

Singhal, S., **McGreal, S.**, & **Berry, J.** (2013). An evaluative model for city competitiveness: Application to UK cities. *Land Use Policy*, *30*(1), 214–222. https://doi.org/10.1016/j.landusepol.2012.03.018.

Smartcitiescouncil.com. (2014). Smart Cities Council | Teaming to build the cities of the future. [online] Available at: https://smartcitiescouncil.com [Accessed 26 Feb. 2018].

Smarter Cities. (2016, August 03). Retrieved March 01, 2018, from https://www.ibm.com/smarterplanet/us/en/smarter_cities/overview.

Sobh, R., & **Perry, C.** (2006). Research design and data analysis in realism research. *European Journal of Marketing*, *40*(11/12), 1194–1209. https://doi.org/10.1108/03090560610702777

Streitz, N. A. (2009). Ambient intelligence landscapes for realizing the cities of the future: Introduction and overview. In *Roots for the Future of Ambient Intelligence - Adjunct Proceedings, 3rd European Conference on Ambient Intelligence, AmI 2009* (pp. 1–4). Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84898807249&partnerID=40&md5=27c0c9e9baf5583116e62e69213e017d.

Sureshchandra, S. M., **Bhavsar, P. J. J.**, & **Pitroda, D. J. R.** (2016). Review on Identification of Success Factors for Designing of Smart Cities. *International Journal For Science Technology And Engineering*, *2*(9), 125–133. Retrieved from http://ijste.org/Article.php?manuscript=IJSTEV2I9042

The European Commission. (2013). European Innovation Partnership on Smart Cities and Communities: Operational Implementation Plan- First Public Draft. *European Innovation Partnership on Smart Cities and Communities*, 111. Retrieved from http://ec.europa.eu/eip/smartcities/files/sip_final_en.pdf

Thuzar, M. (2012). Urbanization in Southeast Asia: Developing SMart Cities for the Future? *Regional Economic Outlook*, 96–100.

Tok, E., **Al Mohammad, F.**, & **Al Merekhi, M.** (2014). Crafting Smart Cities in the Gulf Region: A Comparison of Masdar and Lusail. *European Scientific Journal (ESJ)*, *2*(June), 130–140. https://doi.org/10.4018/978-1-4666-8205-4.ch020.

Townsend, A. M. (2013). Smart cities: Big data, civic hackers, and the quest for a new utopia. WW Norton & Company.

Transparency Market Research, “Smart Cities Market Expected to Reach USD 1,265.85 Billion Globally,” 07-Dec-2014.[Online]. Available: http://www.transparencymarketresearch.com/pressrelease/smart-cities-market.htm. [Accessed: 08-Feb-2016].

Un.org. (2014). World’s population increasingly urban with more than half living in urban areas | UN DESA | United Nations Department of Economic and Social Affairs. [online] Available at: http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html [Accessed 26 Feb. 2018].

Van Beurden, H., & Andrews, I. (2011). Smart city dynamics: inspiring views from experts across Europe. HvB Communicatie bv.

Van Winden, W., Oskam, I., van den Buuse, D., Schrama, W., va Dijck, EJ., & Frederiks, M. (2016). *Organising smart city projects lessons from Amsterdam*. *Lessons for Amsterdam*. Retrieved from https://admin.dezwijger.nl/wp-content/uploads/2016/11/AUAS-Organising-Smart-City-Projects-Amsterdam.pdf

Vanolo, A. (2014). Smartmentality: The Smart City as Disciplinary Strategy. *Urban*

Studies, 51(5), 883–898. https://doi.org/10.1177/0042098013494427

Veeckman, C., & **Van Der Graaf, S.** (2014). The city as living labortory: A playground for the innovative development of smart city applications. In *2014 International Conference on Engineering, Technology and Innovation: Engineering Responsible Innovation in Products and Services, ICE 2014*. https://doi.org/10.1109/ICE.2014.6871621

Washburn, D., Sindhu, U., Balaouras, S., Dines, R. A., Hayes, N. M., & Nelson, L. E. (2010). Helping CIOs Understand "Smart City" Initiatives: Defining the Smart City, Its Drivers, and the Role of the CIO. *Cambridge, MA: Forrester Research, Inc.*, http://public.dhe.ibm.com/partnerworld/pub/smb/sma.

Washburn, D., & **Sindhu, U.** (2009). Helping CIOs Understand "Smart City" Initiatives. *Growth*, 17. Retrieved from http://c3328005.r5.cf0.rackcdn.com/73efa931-0fac-4e28-ae77-8e58ebf74aa6.pdf

Westerveld, E. (2003). The Project Excellence Model®: Linking success criteria and critical success factors. *International Journal of Project Management, 21*(6), 411–418. https://doi.org/10.1016/S0263-7863(02)00112-6

Winters, J. V. (2011). Why are smart cities growing? who moves and who stays. *Journal of Regional Science*, *51*(2), 253–270. https://doi.org/10.1111/j.1467-9787.2010.00693.x

Woods, (2013). "Smart Cities. Infrastructure, Information, and Communication Technologies for Energy, Transportation, Buildings, and Government: City and Supplier Profiles, Market Analysis, and Fore-casts, Pike Research".

Woods, E., Alexander, D., Rodriguez Labastida, R., & Watson, R. (2016). UK Smart Cities index. uk: Commissioned by Huawei From Navigant Consulting, Inc. Retrievedfromhttp://wwwfile.huawei.com//media/CORPORATE/PDF/News/Huawei_Smart_Cities_Report_FINAL.pdf?la=en.

Yencken, D. (1988). The Creative City. *Meanjin*, *47*(4), 18–19. Retrieved from http://search.informit.com.au/documentSummary;dn=582212487737872;res=IELLCC

Yin, R. K. (2009). *Case Study Research: Design and Methods*. *Essential guide to qualitative methods in organizational research* (Vol. 5). https://doi.org/10.1097/FCH.0b013e31822dda9e

Yin, R. K. (2012). A (VERY) BRIEF REFRESHER ON THE CASE STUDY METHOD The. *Applications of Case Study Research*, 3–20. https://doi.org/10.1080/07388940701860318

Zygiaris, S. (2013). Smart City Reference Model: Assisting Planners to Conceptualize the Building of Smart City Innovation Ecosystems. *Journal of the Knowledge Economy*, *4*(2), 217–231. https://doi.org/10.1007/s13132-012-0089-4.

APPENDICES

Appendix A: Survey Questions for Smart City Participants.
Appendix B: Content of the email that was sent to the participants in this research.
Appendix C: List of surveyed cities.
Appendix D: Default report for the distributed questionnaire.
Appendix E: Ethical approval for the survey.

APPENDIX A

Questionnaire- Developing a Smart Framework for Smart City Projects Management in Europe.

A1- Smart Planning Practices

Based on your experience, what are the most important factors in planning function that influence the success of smart city projects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Project goals are clearly defined at start-up	☐	☐	☐	☐	☐
Project goals are made clear to all participants	☐	☐	☐	☐	☐
Project has clear deliverable objectives	☐	☐	☐	☐	☐
Project benefits are identified for all stakeholders at start-up	☐	☐	☐	☐	☐
Project risk is identified	☐	☐	☐	☐	☐
Customers/users are involved in the project	☐	☐	☐	☐	☐
Project management method is defined	☐	☐	☐	☐	☐
Business model is well determined	☐	☐	☐	☐	☐
Project sponsors strongly support the project	☐	☐	☐	☐	☐
Local government supports the project	☐	☐	☐	☐	☐
Citizens support the project	☐	☐	☐	☐	☐
Available policies don't encounter with the project agenda	☐	☐	☐	☐	☐
The project relies on ICT solutions	☐	☐	☐	☐	☐
Project size affects the planning function	☐	☐	☐	☐	☐
Project context affects the planning function	☐	☐	☐	☐	☐

A2- Smart Organizing Practices

-Based on your experience, what are the most important factors in organizing function that influence the success of smart city projects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Project structure is defined	☐	☐	☐	☐	☐
Team responsibilities are clarified	☐	☐	☐	☐	☐
Partnering between public and private businesses	☐	☐	☐	☐	☐
Use of innovative funding for project	☐	☐	☐	☐	☐
Activities are well defined	☐	☐	☐	☐	☐
A smart city project brand is developed	☐	☐	☐	☐	☐
Project size affects the organizing function	☐	☐	☐	☐	☐
Project context affects the organizing function	☐	☐	☐	☐	☐

A3-Smart Leading Practices

Based on your experience what are the most important factors in leading function that influence the success of smart city projects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Appropriate project manage is assigned	☐	☐	☐	☐	☐
Leadership style is defined	☐	☐	☐	☐	☐
Team members are well experienced in their position	☐	☐	☐	☐	☐
Training is provided for all project team members	☐	☐	☐	☐	☐
Communication among all	☐	☐	☐	☐	☐

stakeholders					
Change management practices are taken by the project leader	☐	☐	☐	☐	☐
Project is taking advantage of previous projects experience	☐	☐	☐	☐	☐
Knowledge is shared among team members	☐	☐	☐	☐	☐
Collaboration is effective among team members	☐	☐	☐	☐	☐
Collaboration among stakeholders	☐	☐	☐	☐	☐
Project size affects the leading function	☐	☐	☐	☐	☐
Project context affects the leading function	☐	☐	☐	☐	☐

A4- Smart Controlling Practices

- Based on your experience, what are the most important factors in controlling function that influence the success of smart city projects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Project monitoring and reporting mechanisms	☐	☐	☐	☐	☐
Continues data and knowledge exchange	☐	☐	☐	☐	☐
Research and development are continues process in the project	☐	☐	☐	☐	☐
oject size affects the controlling function	☐	☐	☐	☐	☐
Project context affects the controlling function	☐	☐	☐	☐	☐

-What other Practices that have not been discussed may contribute to smart city projects success?

B- Project Success

- Based on your experience, smart city projects success is measured on the basis of:

	Strongly agree	Agree	Disagree	Strongly disagree
The project is completed with the planned budget	☐	☐	☐	☐
The project is completed with the planned time	☐	☐	☐	☐
The project delivered and meets all specification in the planning stage	☐	☐	☐	☐
The project result benefits all stakeholders	☐	☐	☐	☐
Project creates a positive impact on people	☐	☐	☐	☐
Project creates a positive impact on environment	☐	☐	☐	☐
Project creates a positive impact economically	☐	☐	☐	☐
Project generated new knowledge	☐	☐	☐	☐

-What other factors that have not discussed may be used to measure smart city projects success?

____

C-Profile of the Project and Respondent

1- Name of the project

____

2- Project type

____

3- Project Location

____

4-Project ownership

- Public
- Private
- Joint (PPP)

5- Project Size

- Small
- Medium
- Large

6- Project status

- Ongoing
- Successfully implemented
- Failed

7- Your current position/ Job title in the project

___

8- Educational background

___

9- Experience in smart city projects
- 1-5 Years
- 5-10 Years
- More than 10 Years

___

APPENDIX B

Content Of The Emaıl That Was Sent To The Partıcıpants In Thıs Research.

Subject: Invitation to participate in the research on" Developing a smart framework for smart city projects management in Europe."

Dear Participants;

With sincerity, I wish to invite you to participate in a research about smart city projects management **(Smart Cities, Smarter Management Developing a smart framework for smart city projects management In Europe)**. The purpose of this study is to identify smart practices in smart city projects management in Europe that could increase projects success. The survey will not take more than 10-15 mins to complete. Also, the research final results will be shared with you hoping that it could add valuable knowledge.

The study is undertaken by Tara Alshahadeh under the supervision of Prof.Akin Marsap for her master's degree in business management in Aydin university-Istanbul- turkey.

I seek your genuine cooperation in answering this questionnaire precisely; your answers will be confidential, and all participants will remain anonymous.

To participate in the survey, please click on the link below:

https://qtrial2018q1az1.az1.qualtrics.com/jfe/form/SV_cOtF5Whbs6AQZq5

Thank you for your assistance.

Yours Sincerely,

Tara Alshahadeh, Advisor: Prof.Akin Marsap

Mobile: + 905349640796

Email: Tara.shehadeh@gmail.com

APPENDIX C

List of surveyed cities.

The questionnaire was distributed to the 28 European countries which are:

EU COUBTRIES		
Austria	France	Malta
Belgium	Germany	Netherlands
Bulgaria	Greece	Poland
Croatia	Hungary	Portugal
Cyprus	Ireland	Romania
Czech Republic	Italy	Slovak Republic
Denmark	Latvia	Slovenia
Estonia	Lithuania	Spain
Finland	Luxembourg	Sweden
United Kingdom		

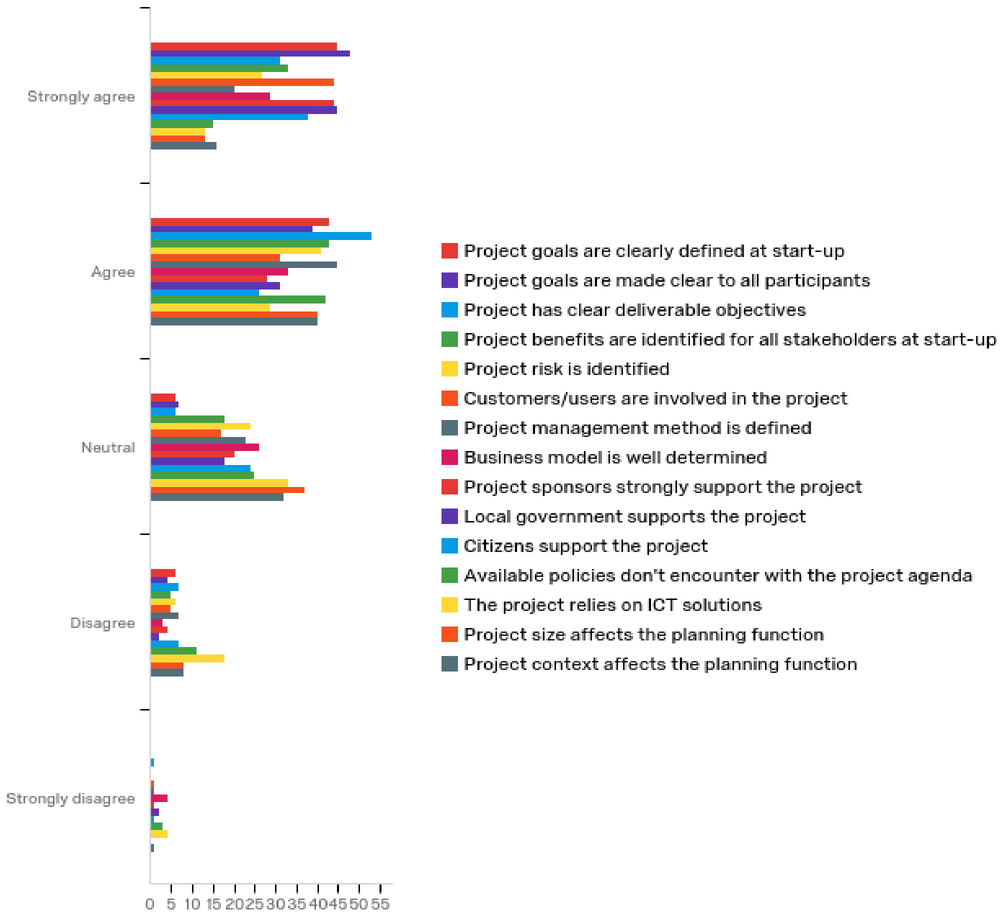
The questionnaire results included the following cities:

City	Country	City	Country	City	Country
Vienna	Austria	Dublin	Ireland	Utrecht	Netherlands
Brussels	Belgium	Brescia	Italy	Fredrikstad	Norway
Liège	Belgium	Cagliari	Italy	Warsaw	Poland
Verviers	Belgium	Milan	Italy	Lisbon	Portugal
Sofia	Bulgaria	Monza	Italy	Bucharest	Romania
Ostrava	Czech Republic	Salerno	Italy	Bratislava	Slovakia
Copenhagen	Denmark	Trento	Italy	Trieste	Slovenia
Tallinn	Estonia	Turin	Italy	Barcelona	Spain
Kuopio	Finland	Luxembourg	Luxembourg	Madrid	Spain
Lyon	France	Amersfoort	Netherlands	Tres Cantos	Spain
Montpellier	France	Amesterdam	Netherlands	Birmingham	UK
Montrouge	France	Apeldoorn	Netherlands	Brighton	UK
Paris	France	Eindhoven	Netherlands	Cambridge	UK
Duisburg	Germany	Hilversum	Netherlands	Edinburgh	UK
Hattenhofen	Germany	Nes	Netherlands	Hammersmith	UK
Mannheim	Germany	Nijmegen	Netherlands	Kingston	UK
Oberhausen	Germany	Rotterdam	Netherlands	London	UK
Siegen	Germany	Swalmen	Netherlands		
Budapest	Hungary	The Hague	Netherlands		

APPENDIX D

Default Report for the distributed questionnaire.

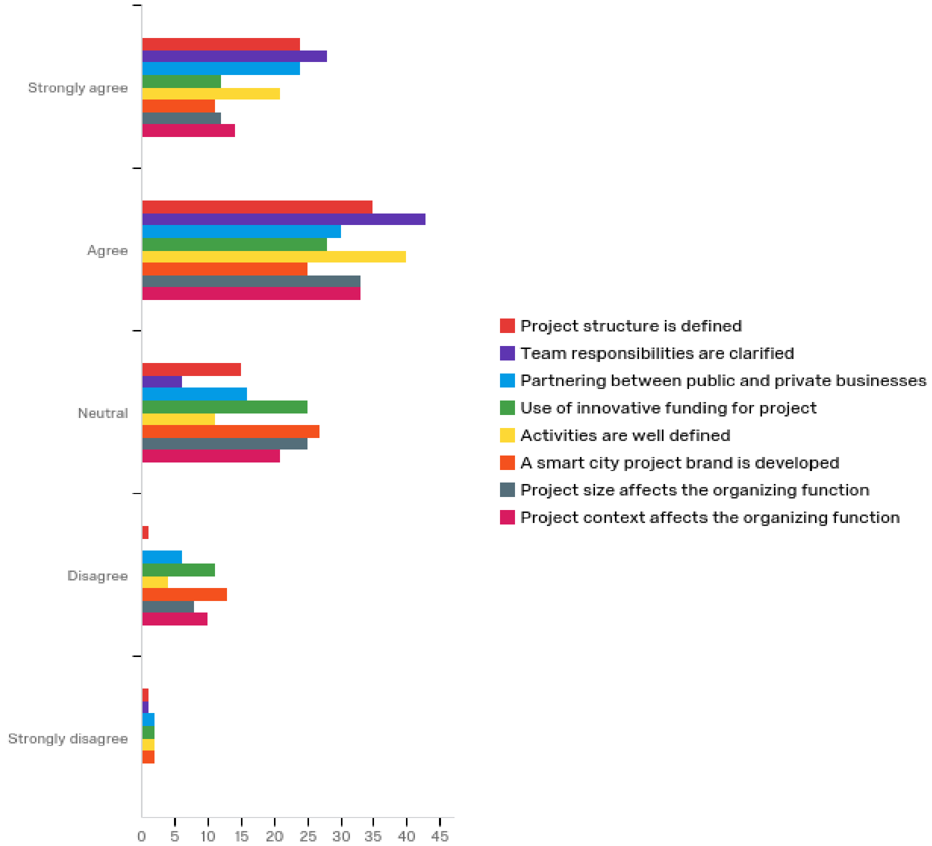
QID1 - Based on your experience, what are the most important factors in planning function that influence the success of smart city projects?



#	Question	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Total
1	Project goals are clearly defined at start-up	45.00%	45	43.00%	43	6.00%	6	6.00%	6	0.00%	0	100
2	Project goals are clear to all stakeholders	48.98%	48	39.80%	39	7.14%	7	4.08%	4	0.00%	0	98
3	Project has clear deliverable objectives	31.63%	31	54.08%	53	6.12%	6	7.14%	7	1.02%	1	98

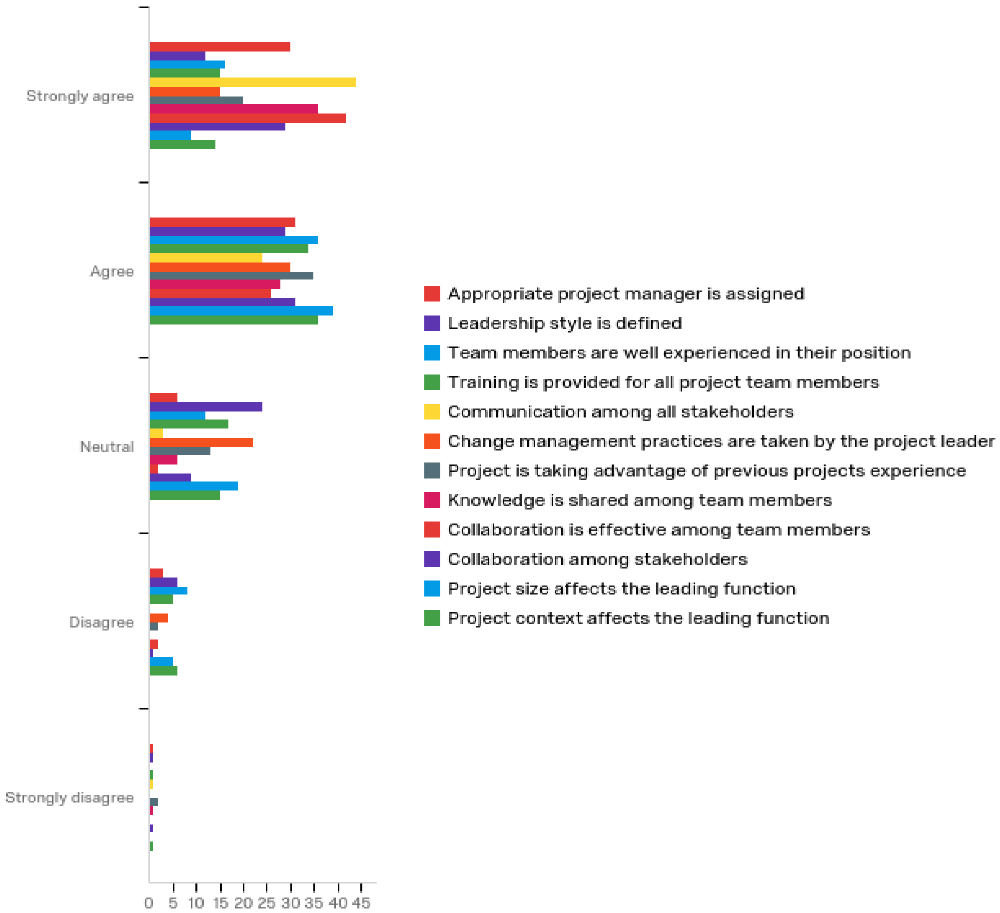
4	Project benefits are identified for all stakeholders at start-up	33.33%	33	43.43%	43	18.18%	18	5.05%	5	0.00%	0	99
5	Project risk is identified	27.55%	27	41.84%	41	24.49%	24	6.12%	6	0.00%	0	98
6	Customers/users are involved in the project	44.90%	44	31.63%	31	17.35%	17	5.10%	5	1.02%	1	98
7	Project management method is defined	20.83%	20	46.88%	45	23.96%	23	7.29%	7	1.04%	1	96
8	Business model is well determined	30.53%	29	34.74%	33	27.37%	26	3.16%	3	4.21%	4	95
9	Project sponsors strongly support the project	45.36%	44	28.87%	28	20.62%	20	4.12%	4	1.03%	1	97
10	Local government supports the project	45.92%	45	31.63%	31	18.37%	18	2.04%	2	2.04%	2	98
11	Citizens support the project	39.58%	38	27.08%	26	25.00%	24	7.29%	7	1.04%	1	96
12	Available policies don't encounter with the project agenda	15.63%	15	43.75%	42	26.04%	25	11.46%	11	3.13%	3	96
13	The project relies on ICT solutions	13.40%	13	29.90%	29	34.02%	33	18.56%	18	4.12%	4	97
14	Project size affects the planning function	13.27%	13	40.82%	40	37.76%	37	8.16%	8	0.00%	0	98
15	Project context affects the planning function	16.49%	16	41.24%	40	32.99%	32	8.25%	8	1.03%	1	97

QID2 - Based on your experience, what are the most important factors in organizing function that influence the success of smart city projects?



#	Question	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Total
1	Project structure is defined	31.58%	24	46.05%	35	19.74%	15	1.32%	1	1.32%	1	76
2	Team responsibilities are clarified	35.90%	28	55.13%	43	7.69%	6	0.00%	0	1.28%	1	78
3	Partnering between public and private businesses	30.77%	24	38.46%	30	20.51%	16	7.69%	6	2.56%	2	78
4	Use of innovative funding for project	15.38%	12	35.90%	28	32.05%	25	14.10%	11	2.56%	2	78
5	Activities are well defined	26.92%	21	51.28%	40	14.10%	11	5.13%	4	2.56%	2	78
6	A smart city project brand is developed	14.10%	11	32.05%	25	34.62%	27	16.67%	13	2.56%	2	78
7	Project size affects the organizing function	15.38%	12	42.31%	33	32.05%	25	10.26%	8	0.00%	0	78
8	Project context affects the organizing function	17.95%	14	42.31%	33	26.92%	21	12.82%	10	0.00%	0	78

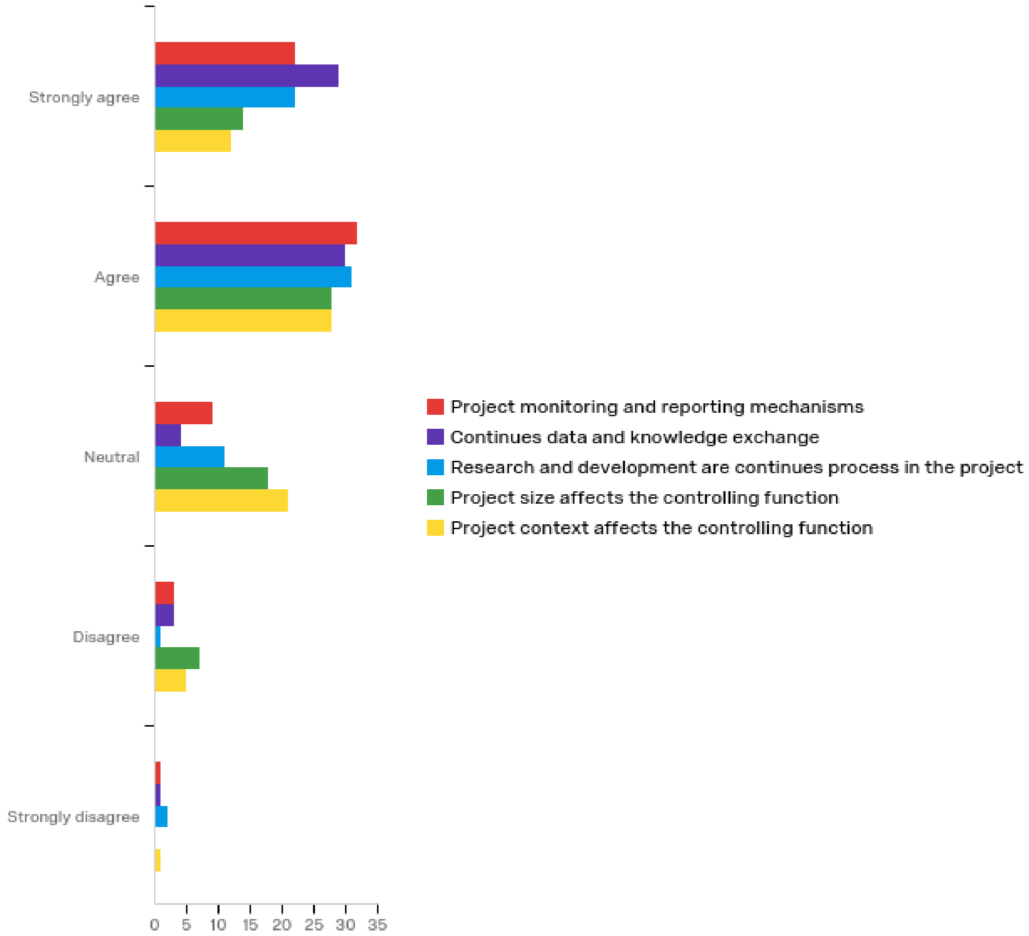
QID3 - Based on your experience, what are the most important factors in leading function that influence the success of smart city projects?



#	Question	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Total
1	Appropriate project manager is assigned	42.25%	30	43.66%	31	8.45%	6	4.23%	3	1.41%	1	71
2	Leadership style is defined	16.67%	12	40.28%	29	33.33%	24	8.33%	6	1.39%	1	72
3	Team members are well experienced in their position	22.22%	16	50.00%	36	16.67%	12	11.11%	8	0.00%	0	72
4	Training is provided for all project team members	20.83%	15	47.22%	34	23.61%	17	6.94%	5	1.39%	1	72
5	Communication among all stakeholders	61.11%	44	33.33%	24	4.17%	3	0.00%	0	1.39%	1	72
6	Change management practices are taken by the project leader	21.13%	15	42.25%	30	30.99%	22	5.63%	4	0.00%	0	71

7	Project is taking advantage of previous projects experience	27.78%	20	48.61%	35	18.06%	13	2.78%	2	2.78%	2	72
8	Knowledge is shared among team members	50.70%	36	39.44%	28	8.45%	6	0.00%	0	1.41%	1	71
9	Collaboration is effective among team members	58.33%	42	36.11%	26	2.78%	2	2.78%	2	0.00%	0	72
10	Collaboration among stakeholders	40.85%	29	43.66%	31	12.68%	9	1.41%	1	1.41%	1	71
11	Project size affects the leading function	12.50%	9	54.17%	39	26.39%	19	6.94%	5	0.00%	0	72
12	Project context affects the leading function	19.44%	14	50.00%	36	20.83%	15	8.33%	6	1.39%	1	72

1-Based on your experience, what are the most important factors in controlling function that influence the success of smart city projects?



#	Question	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Total
1	Project monitoring and reporting mechanisms	32.84%	22	47.76%	32	13.43%	9	4.48%	3	1.49%	1	67
2	Continues data and knowledge exchange	43.28%	29	44.78%	30	5.97%	4	4.48%	3	1.49%	1	67
3	Research and development are continues process in the project	32.84%	22	46.27%	31	16.42%	11	1.49%	1	2.99%	2	67
4	Project size affects the controlling function	20.90%	14	41.79%	28	26.87%	18	10.45%	7	0.00%	0	67
5	Project context affects the controlling function	17.91%	12	41.79%	28	31.34%	21	7.46%	5	1.49%	1	67

2-What other Practices that have not been discussed may contribute to smart city projects success?

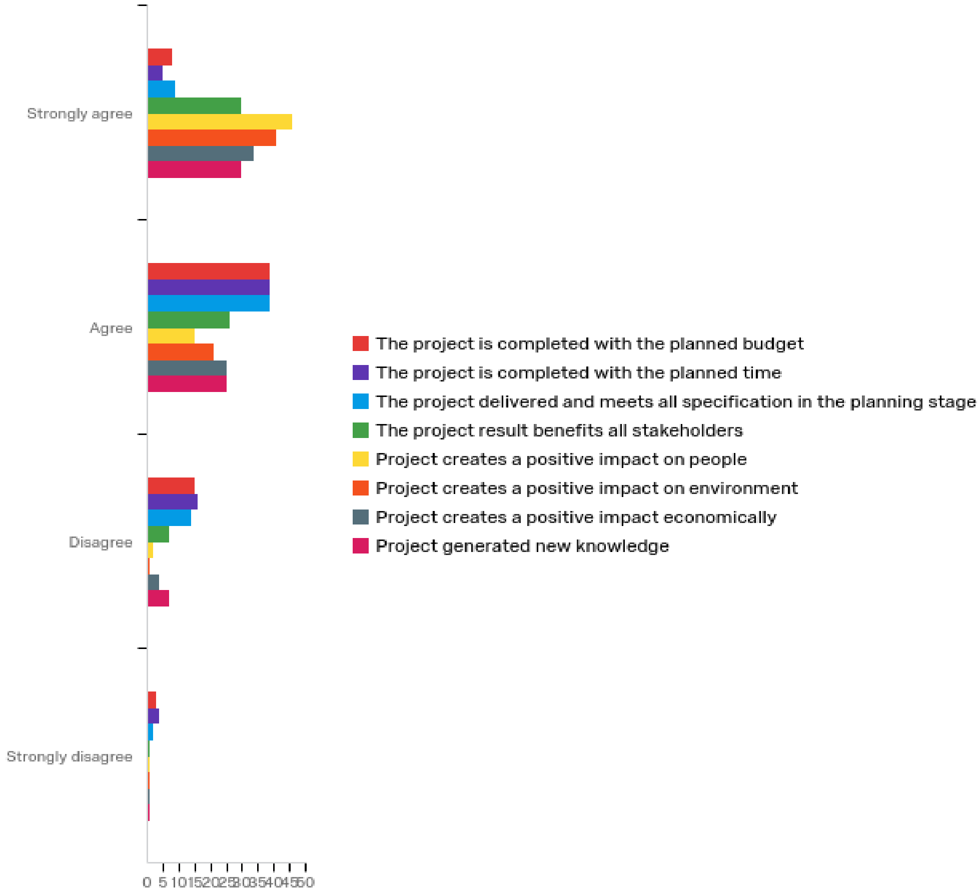
What other Practices that have not been discussed may contribute to smart city projects success?
Experience in developing urban projects in existing context
Out-of-the-box technics to be trained and/or implemented
Making impacted citizens an active part of the planning. Defining clear smart criteria for project success in each category.
Discussing expectations beforehand/ how to handle legal stuff/ create a safe environment to brainstorm for real innovation to take place
Full risk assessment - determine the risk migration.
(1) Monetization methods of any infra or technology implemented needs to be defined

along with a business plan. (2) Technology IPR needs to be respected, wherever possible solutions which have an IP should be used and IPR's need to be procured or leased prior to execution.
Many projects are not well executed since they use known solutions and management methods. Besides, organizations that fund, would like to have influence on the solution. That does not bring open discussions on the fact that many solutions do not fit, and many (commercial) vendors would like to have their solutions as foundation, not-withstanding the fact that this solution might not be very suitable. This must be extremely clear at the start of the project: the solutions vendors bring in are not a given!
Awareness in Public for Smart city component should be made or given by government
Create a collaboration between citizens and government/ local public administration
Contingencies Plan, Fall back status, Land Acquisition rules, Convergence of schemes backlog, Resettlement issues etc.
human centric digital services; customer segmentation [city authorities do not own smart cities]; business case and route to ROI
The implementation of an evaluation framework with clear indicators for outcome and success
Les communs urbains
Communication and information. Risk assessment process. To be IN control
Social
communication among the stakeholders, promotion of the project
Private sector capabilities to be harnessed completely
Procurement, Pre-Procurement and market engagement.
Impact and transformation, Ethical responsibility, Sustainable responsibility
Personally defining business objectives, success criteria and desired outcomes

early. Particularly for pilots
Continuous citizen participation in the smart city project: open debates in the need finding phase, testing the pilot project, evaluating the final solution with the users.
Stakeholder management is Key
Adoption from existing best practices
Most of the Smart City projects fail in the implementation due to the lack of soft skills, lack of communication and due to the fact that to often project managers with technical background are in charge.
participation and awareness from citizens
feedback from stakeholders and communities
None
Agile way of working (that is why I do not like appointing a project manager). Indepent teams are better.
Use of correct of-the-shelf solutions / Use an appropriate SC platform adapted to the kind of SC project / Policy alignment of the public servants / Use of Standards like UNE178
There are many other factors, please refer to Bosch et al 2017
participative models between customers/citizens and project team, etc.
Professional approach to experimenting / acceptance of failure as well as need to learn
It is not a practice as such but more the availability of a grand vision -- where it is going and how and who will benefit, PLUS early concrete results so that those involved in the project do see that progress is being made. This gives project team the feeling that they are going in the right direction.

Communication

1- Based on your experience, smart city projects success is measured on the basis of:



#	Question	Strongly agree		Agree		Disagree		Strongly disagree		Total
1	The project is completed with the planned budget	12.31%	8	60.00%	39	23.08%	15	4.62%	3	65
2	The project is completed with the planned time	7.81%	5	60.94%	39	25.00%	16	6.25%	4	64
3	The project delivered and meets all specification in the planning stage	14.06%	9	60.94%	39	21.88%	14	3.13%	2	64
4	The project result benefits all stakeholders	46.88%	30	40.63%	26	10.94%	7	1.56%	1	64
5	Project creates a positive impact	71.88%	46	23.44%	15	3.13%	2	1.56%	1	64

	on people									
6	Project creates a positive impact on environment	64.06%	41	32.81%	21	1.56%	1	1.56%	1	64
7	Project creates a positive impact economically	53.13%	34	39.06%	25	6.25%	4	1.56%	1	64
8	Project generated new knowledge	47.62%	30	39.68%	25	11.11%	7	1.59%	1	63

2- What other factors that have not discussed may be used to measure smart city projects success?

What other factors that have not discussed may be used to measure smart city projects success?
Project create a better urban experience on the tourists
none
Data access and availability is the key metric for improving a smart city, where profit is the key driver to a smart building.
even if the project is not completed, you should take care of ensuring trust between stakeholders/ when working with citizens, make sure they get something in return: it can have a good impact on community building
Tone at the top, information and communication, report and information
Do citizens feel the difference! I completely miss in many projects the crucial factor: we execute these projects so that CITIZENS (also known as customers!) are seeing and feeling the difference, and you should measure that!
Its Planning in i initial stage which make the development smart. Its not only IT & Technology, it’s over all plan incorporating local and environmental concern addressing all the utilities
people became active part during the development of a smart cities project
Service deliveries and capacity building of officials as well as citizens
benefits realization plan, monitoring and evaluation
Inclusion social
The project generates change IN behavior.
Increase in city competitiveness and brand

The project spurs greater interest in future smart city projects.
political impact (law)
Creating a new jobs
Time; delay and not showing progress frustrates. Speed on execution is Key
sustainability of the project after the end of subsidies/funding period
Attitude change of households - mainly understanding that households are in control of their energy and the environment. Households are now just victims of city policy's, but active participant in the process of changing environment and energy management.
realize projects together with citizens; define their needs/wishes
Projects that help make politicians look good (public opinion).
The degree of citizen as democratic participants, as co-producers. Please refer to simonofski et al 2017
living standard, customer satisfaction
Improve reputation / Public Relations / Marketing
I am sorry -- you above list is too optimistic. The reality while all of criteria is important, NOT all will be met. Smart city projects will encounter numerous problems that no one has anticipated. My answers are what I think are desirable but if truth is to be told, many of them cannot be achieved all at the same time...

1- Name of the project

Not working on Smart City projects anymore. Now: Future Technologies in Education
Living Lab Scheveningen
Integration of autonomous bus into ITS system
In the works
Smart light system
Citizens Engagement application and IOt's
Many
Orange Smart City
poliTOpolYOU
Smart cities Mission, India
internet of citizens

Espresso
Tarragona Smart Mediterranean City
Diamniadio ville intelligente
Urban Lab Making Cosenza
SMILE
Sharing Cities
Smart cities
MUSR
Generationship
Smart Cities Challenge
SBIR Challenges - see Smart Dublin Website - www.smartdublin.ie
Ipswich smart city
reSquare
EMMIA
Slovak Smart City Cluster
Fast Internet
bicycle highway
Smart City Coin
Saint Sofia project
NL
Scda
Many SC projects
Smart City Cyber security lab

2- Project type

public educational organization
R&D specification, realization, exploitation
Start-Up Style
IoT implementation
Sustainable renovation of housing/ infrastructure on a neighborhood level
Energi, light pollusjon
Location based services: Parking, Crowd Sourced CCTV, mCouponing

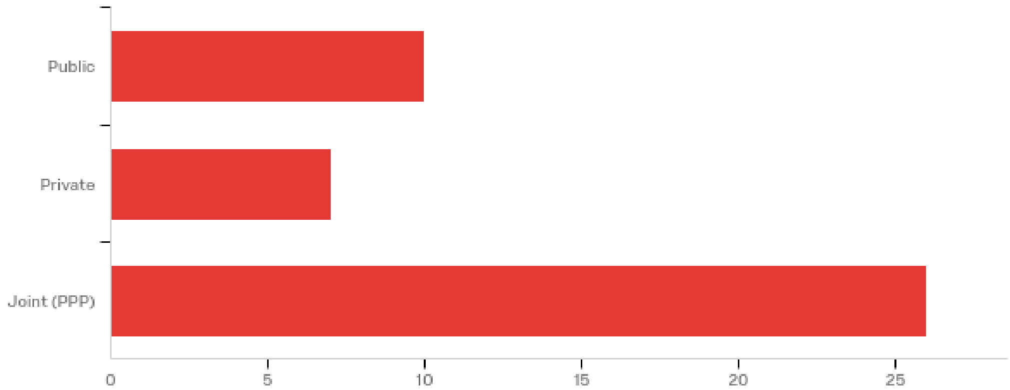
Pilots and sclae up
Township / City development to an extent of about 1000 acres
Joint Project Research with top universities
Government-PPP-Consulting
citizen centric mobility, energy and health services at city scale
Horizon 2020 Research and Innovation Action Funded by the European Commission
Ville nouvelle
Create smart solutions in the urban sphere
European project
Energy in public and private sector.
R&D
Social
I Think based asset management in smart cities
Smart City transformation
Various Innovation projects
Tech pilot
recreation/architecture
PLP Policy learning platform
Smart City Concepts Development, Project Portfolio Creating, Program Management, Quality Assurance
Next Generation Access to all addresses
smart mobility
community based organization
3 year project
Cityzen
Glasfiber network
Research Energy
Patrimonial, Energy, Mobility, Environmental, Citizen Participation,...
Test bed for dealing with cyber security challenges in Smart cities
Program

3-Project Location

Kuopio, Finland, EU project
Scheveningen, The Netherlands
Amsterdam
Fredrikstad
Amsterdam. Rotterdam, Eindhoven
Pen, MMR, Maharashtra
Turin and Hong Kong
Aberdeen
European Union (7 Countries)
Tarragona (Spain)
Diamniadio
Cosenza – Italy
Turin
Milano- Italy
Norway
Europe
Liege - Belgium
UK, Australia
Dublin, Ireland
Ipswich qld australia
Warsaw
EU- 6 countries
Slovakia
Netherlands
Germany
Europe - not specific to one location
Sofia, Bulgaria
Amstedam Grenoble
Mid. NL

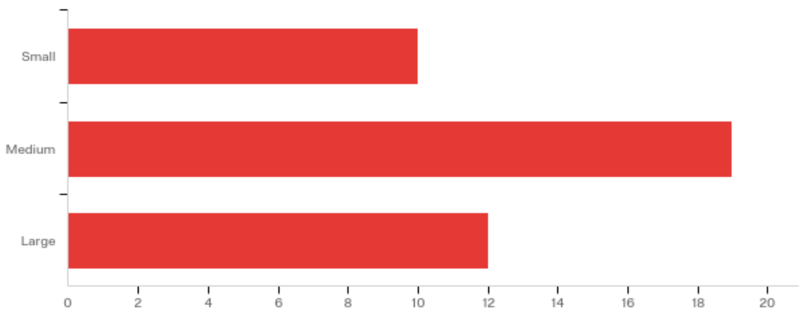
Vienna
Spain
Greater Copenhagen
Rotterdam

4-Project ownership



#	Answer	%	Count
1	Public	23.26%	10
2	Private	16.28%	7
3	Joint (PPP)	60.47%	26
	Total	100%	43

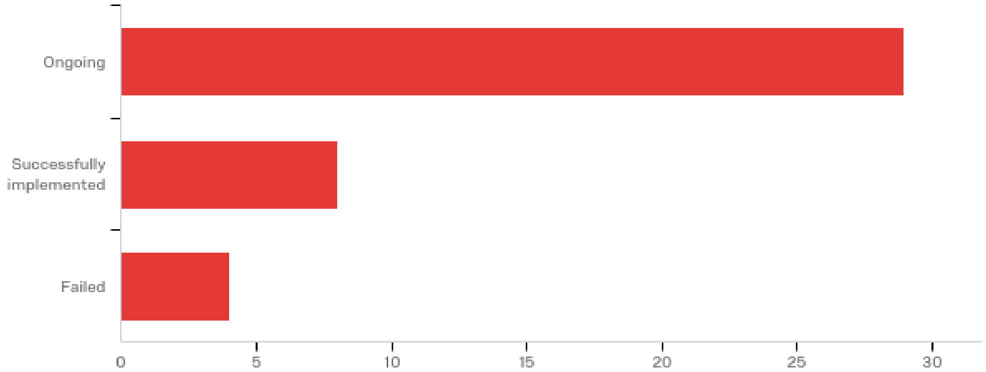
5- Project Size



#	Answer	%	Count
1	Small	24.39%	10
2	Medium	46.34%	19

3	Large	29.27%	12
	Total	100%	41

6- Project status



#	Answer	%	Count
1	Ongoing	70.73%	29
2	Successfully implemented	19.51%	8
3	Failed	9.76%	4
	Total	100%	41

7- Your current position/ Job title in the project

Project contact
Architect, urban planner
CFO of start-up partner (start-up is a subsidiary of our normal company)
Engineer
President
Researcher
CEO, project manager
OEM
Various, CTO, CDO
Vice President
Engineer Sales

PhD student and active researcher
Consultant
project manager
Consultant
Scientific advisor
Doctorant
Apprentice
None
Manager for lamppost solutions
Supplier
Strategy Science Consulting in Architecture and Urban Developing
Marketing manager
Product owner, software vendor
Principal Consultant
Smart City Planner
Tech lead - smarter technology solutions
Project leader
partner/PR + mkt communication
Member of the Board
Coordinator civil participation
Advisor
CEO
researcher/writer
Local coordinator
Director Smart City
Manager
General Manager
Development Programme Manager
CEO
CEO

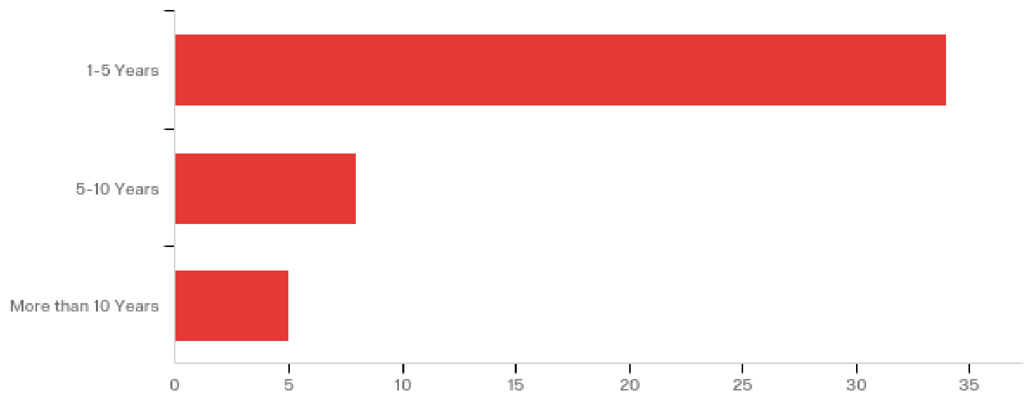
Program Manager Digital Experience Center

8- Educational background

2 Masters degrees: Health Sciences / M.Sc.
TU Delft, MSC Architecture, Engineer
Finance
Masters degree in Mechanical Engineering
B.S. Human Development and A.S. in Allied Health
Master in Public Policy & Governance
Internal Auditor, master, Business education
Engineering Graduate.
University
Masters in Regional Planning
Appeared for B Tech.
Bachelor and master degree in Architecture
Engineer-Planner-Management
msc digital techniques, prince2 and msp
PhD in Economics
Engineering and sustainability science
Université cheikh anta Diop de Dakar
Sociology
Sustainable energy efficiency Engineer
Architect
automation
Internal Aditor, Master IN leadership
Urban Design , Architecture , Mechanical Engineering
Master in financial analysis and audit
MBA
Management and Engineering Graduate
Urban Planning, Data Analytics, GIS and Surveying
Information systems, MBA

Civil Engineering
University, PhD
PHD. The Technical University of Košice, Slovakia - Faculty of Electrical Engineering and Informatics
Change management
technical and economics
Business Administration
Academy of Arts Spatial Design, Erasmus University PhD-prep
Master
Management
Bsc civil engineering
University
Master’s Degree
Engineering + MBA
Business administration and computer sceince
Master Degree

9- Experience in smart city projects



#	Answer	%	Count
1	1-5 Years	72.34%	34
2	5-10 Years	17.02%	8
3	More than 10 Years	10.64%	5
	Total	100%	47

APPENDIX E

Evrak Tarih ve Sayısı: 11/06/2018-3212

T.C.
İSTANBUL AYDIN ÜNİVERSİTESİ REKTÖRLÜĞÜ
Sosyal Bilimler Enstitüsü Müdürlüğü

Sayı : 88083623-044-3212 11/06/2018
Konu : TARA ALSHAHADEH'nın Etik Onay Hk.

Sayın TARA ALSHAHADEH

Enstitümüz Y1612.130067 numaralı İşletme (İngilizce) Anabilim Dalı İşletme Yönetimi (İngilizce) tezli yüksek lisans programı öğrencilerinden TARA ALSHAHADEH'nın "SMART CITIES, SMARTER MANAGEMENT" adlı tez çalışması gereği online anketi 07.06.2018 tarihli ve 2018/15 sayılı İstanbul Aydın Üniversitesi Etik Komisyon Kararı ile etik olarak uygun olduğuna karar verilmiştir.

Bilgilerinizi rica ederim.

Prof. Dr. Özer KANBUROĞLU
Müdür

Evrakı Doğrulamak İçin : https://evrakdogrula.aydin.edu.tr/enVision.Dogrula/BelgeDogrulama.aspx?V=BENU2SR7

Adres:Beşyol Mah. İnönü Cad. No:38 Sefaköy , 34295 Küçükçekmece / İSTANBUL
Telefon:444 1 428
Elektronik Ağ:http://www.aydin.edu.tr/

Bilgi için: NESLİHAN KUBAL
Unvanı: Enstitü Sekreteri

RESUME

Name Surname: Tara Alshahadeh

Place and Date of Birth: Damascus- 01.01.1989

E-Mail: Tara.shehadeh@gmail.com

Website: Tara-sh.com

EDUCATION:

- **Bachelor: 2013**, Damascus University, Civil Engineering Faculty
- **Master:** 2018, Aydın University, Graduate School (Institute) of Social Sciences, Business Administration.