M-GOVERNMENT ACCEPTANCE FRAMEWORK FOR THE MINISTRY OF HOUSING AND URBAN PLANNING IN OMAN

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UNIVERSITI PENDIDIKAN SULTAN IDRIS

2022

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05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

THESIS PRESENTED TO QUALIFY FOR A DOCTORATE OF PHILOSOPHY

FACULTY OF ART, COMPUTING AND CREATIVE INDUSTRY
UNIVERSITI PENDIDIKAN SULTAN IDRIS

2022

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

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ACKNOWLEDGEMENT

All praise and glory to ALLAH, the Almighty, the Greatest of All, on whom we depend for sustenance and guidance in the end. I'd like to express my gratitude to Almighty Allah for providing me with the opportunity, commitment, and resources to complete my study.

May God's everlasting grace and mercy be with me throughout my life and grant me all strength, wisdom, understanding, and right guidance so that I may continue to spread the truth.

One of the highest deeds and the most eloquent sayings is a person's recognition of the favor to whomever I do a favor, and the best known is what the professor provides to his students in terms of information, directions, and instructions that illuminate the path of life for them and open horizons for research so that they can draw from the source of pure knowledge that yields decent morals, good treatment, and resurrection Duties and abiding by the requirements of knowledge, following their teachers, guided by their directions and advice.

I extend my heartfelt thanks to my esteemed teacher: Prof. Madya Ts. Dr. Shamsul Arriey Ariffin For what he provided me with information, instructions, and directions that were a guiding light in my research until the structure reached its fullest, so may God reward him for me with the best reward, and to God be praised and grateful for the grace and honor.

I also extend my heartfelt thanks to all the distinguished professors who graciously read this letter, forgiving their comments, directives and repaying the mistakes that those who survived the research said. I would also like to thank my co-supervisor, Prof Madya Dr.Aslina Binti Saad, for her goodness and encouragement from the start of my studies.

I would also like to thank my external co-supervisor Dr. Ramalingam for her kindness and support from the beginning of my study. I'd also like to express my heartfelt gratitude and admiration for Dr.Bilal Bahaa Zaidan, Dr.Aws Alaa Zaidaan and Dr.Abdullah Hussein Alamoudi for their unending advice, mentoring, and encouragement. I'd also like to thank all of the participants for giving up their time to be a part of this thesis. I'd also like to express my gratitude to all of the friends I've made during my studies.

We've been as a family and shared our joys and sorrows together. We've been training and inspiring each other to complete our tests all day and night.

May our friendship last forever, and may ALLAH continue to bless you.

I can't thank my parents, brothers, and wife enough for their unwavering love and belief in me. You were my staunchest supporters and the driving force behind where I am now.

I hope I've done you justice. May ALLAH bless you and grant you a lifetime of health and happiness. Last but not least, I'd like to express my heartfelt gratitude to Dr. Salem Abdullah Salem Garfan, my dearest friend and brother, for making my academic life easier.

We started our academic journey together with a master's degree and a Ph.D. I've been admiring your perseverance and determination. I pray that ALLAH blesses you and that you have continued success in your life.

DEDICATION

I dedicate this work as a tribute to my caring family's continual contributions, limitless compassion, and encouragement. This thesis is dedicated to my father, who raised and educated me to become the person I am today. To my mother for her never-ending prayers, guidance, and affection throughout my life, and my sisters and brother for their unending encouragement and support. This thesis is dedicated to the love of my life, my wife. You should know that this was not an easy task, and I was inspired by the thought of how proud you would be once I completed it. I dedicate this study to my good friends, whom I have been honored to know of you. Your help, whether direct assistance or simply standing by me at all times, was critical in completing this project. Some of you have played an important role in this project, and without your support and assistance, I would not be able to complete it as it is now.

I devote this work to my beloved children, whom I have yet to meet. I have been putting in a lot of effort to get to this point because I believe in the value of education and that it will help me live a better life in the future and make you proud of your father.

I dedicate this work as a tribute to my workplace, the Ministry of Civil Service, formerly and currently the Ministry of Labor in the Sultanate of Oman's continual contributions, limitless compassion, and encouragement.

I dedicated this work in appreciation of the Ministry of Housing and Urban Planning in Oman for allowing me to use them as a reference in my studies and for supporting me with ongoing information.

ABSTRACT

Since the turn of the 21st century, service providers such as government departments have transformed their services from e-government to m-government for widespread customer reach. The lack of an application for the Ministry of Housing and Urban Planning to render its services to citizens and the several issues that obstruct the implementation of the system, especially in rural areas, necessitate this study. Therefore, the researcher proposes a novel framework based on the Fuzzy Delphi Model (FDM) to provide digital literacy and services. This framework considered the variables extracted from previous studies. Furthermore, a survey was conducted on 20 experts to determine the accepted variables. Other than that, the conceptual framework is developed from the accepted results using 11 different variables based on the Technology Acceptance Model (TAM). Consequently, a survey was formulated and conducted on 428 relevant citizens to collect the data and evaluate 13 hypotheses using partial least squares structural equation modelling (PLS-SEM). In the results, all the tested hypotheses were supported. After that, an application was developed by considering Nielsen's design principles of human-computer interaction, Shneiderman's eight golden rules, and Culturally Appropriate Design Guidelines (CADG). In addition, 15 experts tested the application, and their answers were analyzed using Fuzzy Delphi. A heuristic evaluation was conducted on 249 participants to evaluate the usability of the developed application, showing that the developed application's design is suitable for the local culture of Oman. Apart from that, the study implications include three aspects: theoretical, methodological, and practical implications. For theoretical implication, using culture and social influence variables is expected to fill the gap within the extant literature, particularly using TAM. For methodological implication, the study has demonstrated that the qualitative approach of thematic analysis, the quantitative SmartPLS, and the Fuzzy Delphi methods can all be combined in a single study. Although the Oman Ministry of Housing and Urban Planning now lacks an application for delivering its services to citizens, by adopting the application suggested herein or some local cultural design elements of the findings of the study. Additionally, it can contribute to helping to deliver better services to its citizens. They can also serve as a resource for many government entities and ministries.

Keywords: M-government, Fuzzy Delphi, Heuristic Evaluation, TAM, Oman.

RANGKA KERJA PENERIMAAN M-KERAJAAN UNTUK KEMENTERIAN PERUMAHAN DAN PERANCANGAN BANDAR DI OMAN

ABSTRAK

Sejak permulaan abad ke-21, pembekal perkhidmatan seperti jabatan kerajaan telah mengubah perkhidmatan mereka daripada e-kerajaan kepada m-kerajaan untuk capaian pelanggan yang lebih meluas. Kekurangan aplikasi Kementerian Perumahan dan Perancangan Bandar untuk memberikan perkhidmatan kepada rakyat serta beberapa isu yang menghalang pelaksanaan sistem tersebut khususnya di kawasan luar bandar telah mewujudkan keperluan untuk melaksanakan kajian ini. Oleh itu, pengkaji mencadangkan rangka kerja baru berdasarkan Fuzzy Delphi Model (FDM) untuk menyediakan literasi dan perkhidmatan digital. Rangka kerja ini mempertimbangkan pembolehubah yang diekstrak daripada kajian lepas berdasarkan tinjauan yang telah dijalankan ke atas 20 orang pakar bagi menentukan pembolehubah yang diterima. Selain daripada itu, rangka kerja konsep dibangunkan daripada keputusan yang diterima menggunakan 11 pembolehubah berbeza berdasarkan Model Penerimaan Teknologi (TAM). Hasilnya, satu tinjauan telah dirumus dan dijalankan ke atas 428 rakyat yang berkaitan untuk mengumpul data dan menilai 13 hipotesis menggunakan Model Persamaan Berstruktur Kuasa Dua Terkecil Separa (PLS-SEM). Dalam keputusan yang diperoleh, semua hipotesis yang diuji telah disokong. Selepas itu, suatu aplikasi telah dibangunkan dengan mempertimbangkan prinsip reka bentuk Nielsen bagi interaksi manusia-komputer, lapan aturan emas oleh Shneiderman, dan Garis Panduan Reka Bentuk Bersesuaian dengan Budaya (CADG). Sejumlah 15 pakar menguji aplikasi tersebut, dan jawapan mereka dianalisis menggunakan Delphi Kabur. Penilaian heuristik telah dijalankan ke atas 249 peserta untuk menilai kebolehgunaan aplikasi yang dibangunkan yang menunjukkan bahawa reka bentuk aplikasi yang dibangunkan itu sesuai untuk budaya tempatan di Oman. Selain itu, implikasi kajian merangkumi tiga aspek: implikasi teori, metodologi dan praktikal. Untuk implikasi teori, penggunaan pembolehubah pengaruh budaya dan sosial dijangka dapat mengisi jurang dalam literatur yang masih ada, terutamanya penggunaan model TAM. Untuk implikasi metodologi, kajian telah menunjukkan bahawa pendekatan kualitatif analisis tematik, kuantitatif SmartPLS, dan kaedah Delphi Kabur semuanya boleh digabungkan dalam satu kajian. Walaupun Kementerian Perumahan dan Perancangan Bandar Oman kini kekurangan aplikasiuntuk menyampaikan perkhidmatannya kepada rakyat, dengan menerima pakai aplikasi yang dicadangkan di sini atau beberapa elemen rekabentuk budaya tempatan dalam penemuan kajian ini. Seterusnya, ia boleh menyumbang dalam membantu menyampaikan perkhidmatan yang lebih baik kepada warga negara. Mereka juga boleh berfungsi sebagai sumber untuk pelbagai entiti dan kementerian kerajaan.

Kata kunci: M-kerajaan, Delphi Kabur, Penilaian Heuristik, TAM, Oman.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ADM	Architecture Development Method
DIT	Diffusion of Innovations
DOI	Diffusion of Innovation theory
IDT	Innovation Diffusion Theory
ISM-MICMAC	Interpretive Structural Modeling Cross-Impact Matrix Multiplication Applied to Classification
ITM	Intention Toward the M-government
M-gov	M-government
MENVIS	Mobile Environmental Information System
MGAUM	Mobile Government Adoption and Utilization Model
MGFHSA	M-government for housing services application
MOH	Ministry of Housing
SCT	Social Cognitive Theory
TAM	Technology Acceptance Model
TOGAF	The open group architecture forum
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action

TTF	Task-Technology Fit
UTAUT	Unified Theory of Acceptance and use of Technology
UTAUT2	Unified Theory of Acceptance and Use of Technology 2

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter briefly introduces the selected research topic and its elements. It also provides the background of this research study and highlights its pressing needs. Further, this chapter states the project's aim, objectives, and scope.

1.2 Research Background

For the past decade, the government has been adopting e-government to improve public service delivery efficiency. The government's main aim is to provide the best services to its citizens, to avoid data duplication, wastage of paper, difficulty accessing and managing data, and loss of data.

The urgent need for facilitating procedures and transactions for citizens and business organizations pushes countries to keep pace with the evolution of data

management worldwide to develop and provide the best efficiency of public service delivery (Serra et al., 2015).

The recent improvements in the technological world, especially Information and communication technology (ICT), have brought many changes in our daily lives. This ICT has transfigured business practices, conductance manners, government delivery mechanisms, and service patterns.

The Internet penetration rate and rapid development in the web and mobile phone technology and its popularity among the people is a witness to the success of this technology. Furthermore, technology has been proven to be the most influential among the other respective technologies in delivering services, engaging the citizens, and consistently improving the efficiency of the number of functions. Based on the facts, many businesses and governments are strategically changing their business and service plans to embrace the benefits of mobile technologies.

Research studies state that Internet technology in government service channels allows citizens to actively engage and get a better service. Other than that, the citizens welcome services, such as delivery channels, which provide faster and quality responses. Internet-based delivery channels, called "e-government", are also improving customer satisfaction (Baid-Agrawal et al., 2014).

Using technology enables governments to deliver services to a significant number of citizens. Most developed countries have aspired to employ technology in delivering public services by governments to their citizens with pinpoint accuracy that will reduce time spent in the delivery process and increase governments' reliability. As

a form of technology, the mobile government (m-government) has become one of the most significant projects that most advanced countries have focused on (Almuraqab et al., 2017).

With the rapid advancement of e-government practices, it has become convenient for the government authorities to get benefits of this critical means of provisions in terms of seamless services for public agencies, citizens, and businesses.

While governments of various states have put some efforts into defining specific guidelines and policies for access to e-government services via the web, no similar efforts have been put into providing guidelines and policies for the provision of m-government. Therefore, government agencies and institutions must consider including m-government services accessibility in their agendas. This is because of mobile applications' increasing importance, which provides services and opportunities for more participating citizens (Serra et al., 2015).

With the recent global uptake of mobile devices, consumer activities have begun to move from electronic (e-business, e-commerce, e-government) to mobile (m-commerce, m-government) services due to the high subscription rate in both developed and developing countries. Apart from that, mobile phones have become integral to most people's everyday lives (Serra et al., 2015).

It is quite undeniable that mobile phones have gained popularity in the contemporary world. In fact, their increasing role in virtually all aspects of daily lives, including m-government services, cannot be overemphasized (Hung et al., 2013).

The major purpose behind using the m-government as the primary element of today's environment is to attain a better government and also the satisfactory outcomes of the initiatives made by the government using the Internet as a primary means of communication. However, there is also an explosion in the use of mobile technologies, which also fosters the extent to the governments produce services using mobile access, such as the use of mobile phones, usage of laptops, and also the usage of personal digital assistants (PDAs) (Ebbers et al., 2016).

These digital technologies connect all the wireless networks while enabling governments and other individuals to transit from the e-government to the m-government, which is fundamentally done using mobile technologies (Fath-Allah et al., 2014).

Oman is one of the countries that have considered the importance of ICTs in the development of the state at every level, either educational or governmental. It has been found that Oman has extensively raised the graph of using mobile and portable devices to establish technological development across the region.

For this purpose, the researcher noticed that Oman has been developing its governmental policies while merging these practices with the process of m-government practices, such as using mobile or portable devices for engaging with the citizens. Nevertheless, the state has also been growing in the attainment of m-government since educational attainment has necessarily changed the dimensions (Abu-Shanab & Haider, 2015).

Although the adoption rate of e-government services is low among citizens, it is a common problem in Arab countries, including Oman.

The reason the old generation is not good at using the techniques also has some difficulties in convincing this old generation. Despite the low rate of adoption of e-government services by governments, it is a common problem in Arab countries, including Oman (Jaradat et al., 2018).

The user intention (INT) model of m-government services developed in this research is expected to be of practical use to these decision-makers. In addition, it is expected to help them better understand the challenges they face, particularly in relation to m-government services implementation (Al-Busaidi, 2012).

One of the main services ministries in Oman is the Ministry of Housing and Urban Planning. Among the ministry's objectives is regulating land use by preparing plots, detailed plans for regions and governorates throughout the Sultanate and distributing the lands to eligible citizens per the provisional laws. In addition, through its housing assistance scheme and non-interest housing loans program, the ministry provides housing units for citizens.

The ministry is also responsible for registering and archiving all original and dependent rights of the real estate units and regulating its transactions ("Mr Abdullah Salem Al-Wahaibi", the director of the Human Resource (HR) Department in the Ministry of Housing) (Housing, 2018; Omanuna, 2018).

Part of the vision of the Ministry of Housing and Urban Planning is the regulation and maintenance of land uses and the provision of suitable housing for

eligible citizens. The ministry's objectives are to prepare studies, research, and detailed maps. Other than that, the ministry includes structural planning in collaboration with the other relevant authorities and in line with the social, economic, and structural development plans of the Sultanate of Oman ("Mr Abdullah Salem Al-Wahaibi" the director of HR Department in the Ministry of Housing) (Housing, 2018; Omanuna, 2018).

Note that the ministry has 56 services. Some of the services include placing lands in possession, granting lands usufruct in coordination with relevant public authorities, and leasing lands, per the provisional rules and regulations, to citizens. It also includes the allocation of land plots needed by the state administrative apparatus units, public institutions and establishments, and legal entities to perform their duties. Furthermore, it registers all transactions and the original dependent rights of the real estate units and regulates its transactions. Likewise, the ministry documents are relevant instruments and legal transactions according to the land registry system and issue title deeds ("Mr. Abdullah Salem Al-Wahaibi", the director of the HR Department in the Ministry of Housing) (Housing, 2018; Omanuna, 2018).

The Ministry of Housing and Urban Planning aims to regulate the use of lands by preparing detailed plans for all regions within the Sultanate of Oman for various purposes, including housing economic purposes used by state administrative apparatus and public authorities. It also carries out the distribution of planned lands according to the law of the lands, reviews possession and applications of yet-to-be-developed and occupied lands, as well as providing suitable houses for eligible nationals via housing assistance and non-interest housing loan programs. In addition, it also carries out the preservation and maintenance of citizens' properties by registering private properties

under the land registry and facilitating their transactions. The ministry is designed to perform social and economic studies to determine future requirements of loans for citizens with limited incomes. Furthermore, part of its goals is to represent Oman regionally and internationally in conferences, seminars, and meetings related to terms of reference of the ministry ("Mr. Abdullah Salem Al-Wahaibi", the director of the HR Department in the Ministry of Housing) (Housing, 2018; Omanuna, 2018).

1.3 Problem Statement

Based on the analyzed articles in the literature related to m-government, many issues were highlighted in many articles. Most of these issues were considered significant due to their importance in the findings. Using moderators between citizens and the government in some services impacts the processing speed, is costly for citizens, and takes a long time to complete (Alsaadi et al., 2018; Alssbaiheen & Love, 2015a; Ohme, 2014). Furthermore, the complexity of workflow makes the provision of services provided by the Ministry of Housing and Urban Planning in Oman slow and complex, which affects the ministry's reputation due to the increase of complaints by citizens (Althunibat et al., 2014).

On the other hand, the services provided by the ministry are still paper-based and manual, which require a field visit by the citizens or to be sent by Oman Post Office. This leads to the difficulty of arriving at the required time, the risk of being lost, the high cost, more energy, and the possibility of not getting the required solutions and, therefore, failure in completing the tasks (Hinai, 2018; Oman Observer, 2019).

Information technology (IT) infrastructure is one of the topper challenges still experienced by Gulf Cooperation Council Countries (GCCC) (Alotaibi et al., 2021; Alrowili et al., 2015; Alsaadi et al., 2018; Alssbaiheen & Love, 2015a, 2016; Ogunleye & van Belle, 2016). Moreover, the Ministry of Housing and Urban Planning in Oman is still lacking in certain issues compared to the other Sultanate ministries regarding technological advancements. It is essential to introduce a new concept and develop a new framework for implementing services, such as m-government. The ministry's failure to adopt m-government development leads to challenges in providing services within the ministry due to some problems that still exist in the implementation of mobile government projects, which can be solved by developing the m-government and hence framework design, development and implementation.

Other than that, some studies mentioned some difficulties were faced during the implementation of m-government (Al Najjar et al., 2019; Alrowili et al., 2015; Alssbaiheen & Love, 2015a; Nzimakwe, 2018; Ogunleye & van Belle, 2016; Rosenbaum et al., 2018; Saxena, 2017, 2018). Furthermore, this is likely to direct the implementation of m-government projects to improve the government's delivery of quality services to its citizens. This implementation requires the development of wireless and mobile networks and related infrastructure, increasing mobile accessibility and penetration, and dealing with the difficult task of protecting the privacy and offering security for both data and interactions. It also requires regulating and developing the legal framework of mobile applications and the use of services (Mahrouqi, 2014).

Based on the literature, different challenges were found related to the current situation of m-government. Lack of awareness was one of the biggest challenges

mentioned in the literature across the developed countries, Middle East countries and GCCC (Abu-Shanab & Shihadeh, 2016; Alonazi et al., 2019; Alotaibi, 2016; Alsaadi et al., 2018; Alssbaiheen & Love, 2015a, 2016, 2021).

Moreover, the lack of awareness of some Omani citizens regarding this technology leads to less usage of the Omani e-government. Therefore, there is a need to identify the influencing factors to use m-government for Oman (Shatat, 2017).

Table 1.1

Summarizing the Literature Gaps and Problems

Summary of the Problem	**Summary of the Literature Finding**	**Brief about the gap**	**Reference to the Literature**
Paper-based working processes by the Ministry of Housing and Urban Planning in Oman and the presence of mediators between government and citizens.	Moderators between government and citizens and the manual paperwork used by the Ministry impact the speed, efficiency and effectiveness of work.	There are no studies that develop and design applications that will solve this problem.	Alsaadi et al. (2018), Ohme (2014), Alssbaiheen et al. (2015a), Oman Observer (2019), Hinai (2018).
The Ministry of Housing and Urban Planning in Oman lacks infrastructure and mobile applications.	The ministry lacks a well-developed mobile application that will assist in delivering its services to citizens	No available studies on why the ministry has no mobile application nor a developed application by existing studies.	Alrowili et al. (2015), Alotaibi et al. (2021), Alssbaiheen and Love (2015a, 2016).
Difficulties in implementing m-government.	These studies examined the difficulties in implementing m-government.	Need studies to investigate factors leading to these difficulties.	Saxena (2017), Alssbaiheen et al. (2015a), Alrowili et al. (2015), Ogunleye and Van Belle (2016)
Lack of m-government usage among citizens	Investigated the lack of awareness in using m-government among Omani citizens	Need studies that will identify and examine factors leading to the lack of awareness among citizens.	Shatat (2017)

Table 1.1 summarizes the literature gaps and research problems emanating from them. It also shows that among the problems identified in the extant literature are paper-based working processes by the Oman Ministry of Housing and Urban Planning, as indicated by several studies such as Alrowili et al. (2015), Alotaibi et al. (2021), and Alssbaiheen and Love (2015a, 2016). Likewise, the Ministry of Housing's lack of infrastructure and mobile applications is another problem identified by Alrowili et al. (2015), Alotaibi et al. (2021), and Alssbaiheen and Love (2015a, 2016). Other researchers such as Saxena (2017), Alssbaiheen et al. (2015a), Alrowili et al. (2015), Ogunleye and Van Belle (2016). Finally, the usage among citizens or the lack of it is another significant problem identified by the extant literature related to this research (Shatat, 2017).

1.4 Research Objectives

This research aims to explain how the Ministry of Housing and Urban Planning in Oman has been developed by employing m-government practices in its operational functions. However, it is also applicable to explore to what extent the Ministry of Housing and Urban Planning in Oman has attained the goals of economic sustainability by the commencement of m-government approaches and by complying with the m-government aspects. It is also important to investigate how m-government has changed the patterns of Oman's Ministry of Housing and Urban Planning and what changes have occurred with the introduction of m-government features in the functional areas of the respective ministry. Therefore, the main purpose of this search study remained to find out how m-government is important to Oman's Ministry of Housing and Urban

Planning and what areas can be covered for further improvement. The researcher explores the Omani citizen's behavior based on the collected data and studies the impact of m-government on using and improving the services. More specifically followings are the objectives of the studies;

The main objectives of this research are as the following:

i. To investigate the current situation of the m-government in Oman to the Omani citizens.
ii. To investigate the potential factors of m-government in Oman.
iii. To develop the framework for m-government in Oman.
iv. To validate the proposed m-government framework.

1.5 Research Questions

The questions of this research are as follows:

i. What is the current status of m-government at the Ministry of Housing and Urban Planning in Oman, and what are the services provided to the citizens?
ii. What are the potential factors for m-government in Oman and citizens?
iii. What is the relationship among the factors of the m-government implementation framework of the Ministry of Housing and Urban Planning in Oman?

iv. How to validate a new framework model for the m-government implementation process in the Ministry of Housing and Urban Planning in Oman?

Table 1.2

Research Questions and Research Objectives

Research Question	**Research Objectives**
RQ1: What is the current status of m-government at the Ministry of Housing and Urban Planning in Oman, and what are the services provided to the citizens?	RO1: To investigate the current situation of the m-government in Oman to the Omani citizens.
RQ2: What are the potential factors for m-government in Oman and citizens'?	RO2: To investigate the potential of m-government in Oman.
RQ3: What is the relationship among the factors of the m-government implementation framework of the Ministry of Housing and Urban Planning in Oman?	RO3: To develop the framework for m-government in Oman.
RQ4: How to validate a new framework model for the m-government implementation process in the Ministry of Housing and Urban Planning in Oman?	RO4: To validate the proposed m-government framework.

1.6 Scope of the Study

The target of this research is the Ministry of Housing and Urban Planning in Oman. In conducting the study, data are gathered from experts on Oman, people living in Oman (mainly citizens) and particularly employees of the Ministry of Housing. This study relies on a mixed methodology combining both quantitative and qualitative approaches to collect the data from participants from employees of all levels at the ministry working in different departments and Omani citizens who rely on the ministry for the services it is designed to provide. Other than that, this study used a systematic review, thematic

analysis, Fuzzy Delphi Model (FDM), partial least square-structural equation modelling (PLS-SEM), Technology Acceptance Model (TAM), and descriptive analysis.

1.7 Research Significance

This study will help analyze the significance of significant technological development, m-government, while showing how this conception can develop economic growth and services provision. The research will offer fundamental insights into the Ministry of Housing and Urban Planning in Oman regarding enhancing mobile devices' usage while satisfying citizens' needs. Note that the research will offer the best usability design principles. Moreover, this research will be insightful in understanding m-government frameworks to be utilized in the information and communication technology dynamics. Hence, the research will benefit future researchers aiming to deliver their thoughts on the significance of m-government.

Similarly, the Ministry of Housing and Urban Planning can also understand how to work on the m-government prototype. Consequently, this study will add valuable knowledge to the literature and will be helpful to future researchers and practitioners, especially in the Sultanate of Oman.

This research shall help the Ministry of Housing and Urban Planning in Oman identify and determine the most likely predictive variables that explain the impact of INT on the use of m-government services for the Ministry of Housing. It may also help the Ministry of Housing and Urban Planning in Oman develop the strategies and the related elements for fostering the sustainability of economic development within Oman.

Furthermore, the findings may help the decision-makers in the Ministry of Housing and Urban Planning in Oman speed up their process of turning into m-government services for the Ministry of Housing. Likewise, the findings are expected to help the Ministry of Housing and Urban Planning in Oman choose the best usability design principles.

This study is essential for the Ministry of Housing and Urban Planning to provide better services. The citizens may save time and money, and experience better service quality, thus increasing customer satisfaction. Apart from that, the m-government application will eliminate the need for an intermediate service provider.

1.8 Knowledge Contribution

The proposed study will contribute to knowledge by applying and testing the applicability of TAM. Its external variables include attitudes (ATT),usage behavior (B), culture (CUL), intention, observability (OB), perceived compatibility (PC), perceived efficiency (PE), perceived ease of use (PEOU), perceived usefulness (PU), social influence (SI), and trust (TRU). As a result, the results of this study provide more information to the researchers, allowing them to identify the crucial variable that influences the INT to use m-government services.

Furthermore, testing individual characteristics will aid researchers working in m-government services in better understanding the characteristics of people who are more likely to use m-government services. External variables that appear essential in adopting m-government programs have also been derived from the literature and used in this analysis.

Besides, this research would benefit decision-makers involved in m-government and mobile service providers' day-to-day work. Additionally, the study would aid other service delivery partners in better understanding and putting into practice m-government programs to meet the needs of citizens. The study's conclusions provide insights into future and current monetary policy adoption. This case is drawn from an award-winning m-government m service that has gained accolades around the globe. Based on this, those working under m-governments may consider it a guide for future endeavours.

1.9 Operational Definition

This section defines the utilized operations and techniques to provide a comprehensive understanding of the research.

Defines important terms as the following:

1. **M-government**

Mobile government or m-government is a result of evolution from the government to e-government to m-government. It is where the government is a platform for national policies to be enforced. The use of IC, especially the Internet has caused the government platform to be more efficient in communicating with the public (Allain-Dupré, 2011). Therefore, in the research context, m-government is the main service that needs to be investigated and developed in the current research.

2. TAM

TAM is one of the most influential models of technology acceptance, with two primary factors influencing an individual's INT to use new technology: PEOU and PU (Alsaadi et al., 2018). In the research context, TAM investigates citizens' opinions towards using m-government services.

3. Fuzzy Delphi Method

The FDM organizes a group communication process between a researcher and a group of designated experts on a specific issue by evaluating individual contributions in terms of information and knowledge (Linstone & Turoff, 2002; Yousuf, 2007). In the research context, Fuzzy Delphi is the mathematical approach utilized to analyze experts' opinions towards the important variables to affect using m-government to be tested on the citizens and to analyze the principles of the heuristic evaluation.

4. Usability Design Principles

Design principles refer to high-level and context-free design goals based on human-computer interaction (Pin, 2015). In the research context, usability design is used as the fundamental principle in developing the m-government application using Nielsen's design guidelines standard that evaluates usability in terms of consistency, simplicity of user interface (UI) design, ease of recall, error management, accessibility, efficiency and flexibility.

5. **Heuristic Evaluation**

Heuristic evaluation refers to a process whereby the usability of user interfaces is measured through independent walkthroughs and report issues (Interaction Design, 2021). In the research context, heuristic evaluation is used to identify mobile applications that are easy to use and have desirable designs.

1.10 Thesis Structure

This thesis has seven chapters, each with its contribution to the argument:

Chapter One: Introduction, Research Background, Problem Statement, Research Objectives, Research Questions, Hypotheses, Scope of the study, Research Significance, Knowledge Contribution, Operational Definition, and the structure of this thesis.

Chapter Two: This chapter reviews the relevant literature to establish the history of m-government, worldwide application of m-government, evaluation of m-government, advantages of mobile-based applications (m-government), usability design principles, Nielsen design guidelines, the design principles, applications, Shneiderman design guideline, the design principles, applications, Culturally Appropriate Design Guidelines (CADG), the design principles, applications, and ISO design guidelines 9241-1.

Chapter Three: This chapter reviews the relevant literature to establish the m-government theory and practice, an overview of m-government, technology and governance, the importance of m-government, the relationship between e-government

and m-government in the middle east-government in Oman, constraints and limitations of m-government in Oman, factors/antecedent affecting m-government, research gap and expected outcomes, m-government evaluation, m-government hypotheses development, m-government framework, variables, discussion, issues and challenges related to m-government, motivations related to m-government, recommendations related to m-government and chapter summary.

Chapter Four: This chapter introduces the research method used to collect the required data, the research design, the triangulation design, population and sampling of the study, population of the study, sample size, sampling procedure, instrumentation, questionnaire design, Instrument translation, content validation, reliability, interview questions, data analysis procedures, Fuzzy Delphi study, and chapter summary.

Chapter Five: This chapter presents the results of the quantitative and qualitative data collected from Chapter 4 and analyzed in Chapter 5.

Chapter Six: This chapter discusses the findings of the quantitative and qualitative data analyzed in Chapter 5 and the chapter summary.

Chapter Seven: This chapter presents the conclusion and future research.

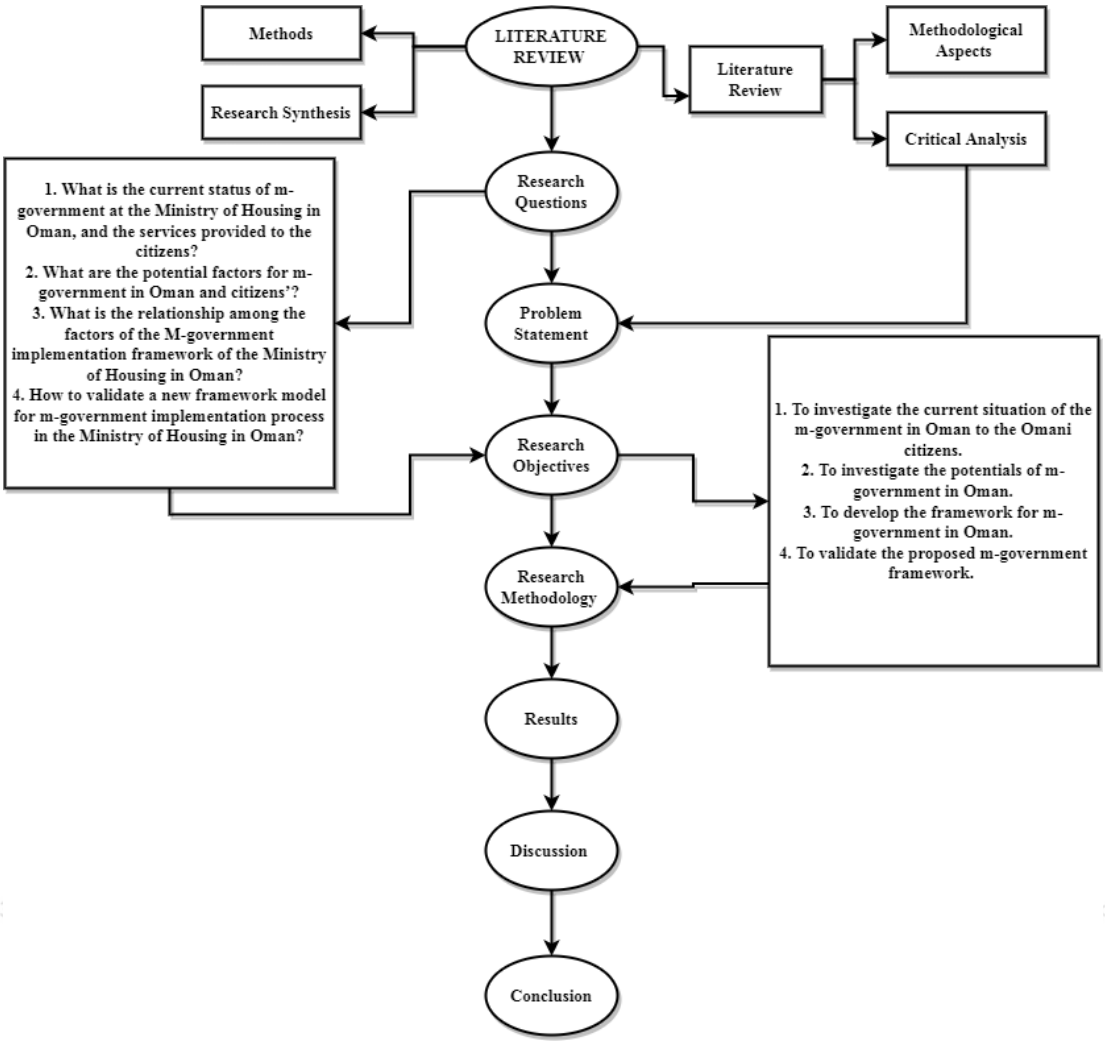

Figure 1.1. Research Flow Chart

To summarize this chapter, as highlighted in Figure 1.1, this chapter starts with an introduction about the study in general. Then, a brief research background is explained. After that, the problem statement is formulated, and on the basis of that, the objectives of the research are generated to answer the research questions. To meet the objectives, the methodology of the research is planned and followed to get and analyze the results of the study. Then a discussion of the results is presented. And lastly, the conclusion of the study is provided.