E-Government: Antecedents to Technology Adoption and Creating Public Value in Pakistan

Shahid Nishat
MS Engineering, MBA

Thesis submitted for the fulfilment of the requirements for the degree of
Doctor of Business Administration

Victoria University, Australia

February 2022

ABSTRACT

E-Government or e-Gov initiatives have attracted substantial public investment by governments around the world. This trend is driven by the premise that these systems improve efficiency, transform public services and enable citizen participation in social democratic processes. The paradox, however, is that unfortunately many such initiatives, particularly in emerging economies like Pakistan, fail to achieve these intended outcomes. The reality is that despite huge investments two issues persist: firstly, a low level of adoption of e-Gov services; and secondly, an inability to achieve the desired impact. Adoption is typically explained in the literature with reference to characteristics of technology, while individual technology disposition is ignored. Impact is typically measured by techno-economic parameters, albeit that impact is best determined by those who use the services – citizens, measured in terms of public value (PV).

This study examined the antecedents of technology adoption and creation of public value impact thereof for individual citizens. Adoption concerns the interaction between system characteristics and individual dispositions, while impact is determined by perceptions of value created by the uptake of e-Gov systems by citizens. The study used a mixed methods approach, with an online survey to collect data and examined adoption and PV using the multivariate technique of Structured Equation Modelling (SEM). Open-ended questions, supplemented by nine semi-structured interviews with senior managers in the government, served to assess how government can support the adoption and creation of public value in Pakistan.

Study findings reveal a significant positive relationship exists between motivating dispositions of optimism and innovativeness and e-Gov use, and a significant negative relationship exists between inhibiting dispositions of discomfort and insecurity and e-Gov use. These results validate the construct of technology readiness (TR) in the context of Pakistan. Both sub-dimensions of TR, motivators and inhibitors were, however, found to have no significant influence on user satisfaction. Conversely, all system characteristics, information, system and service quality appear to influence user satisfaction (US), but with service quality the strongest determinant of US. This latter distinction is important because it emerges that US is more strongly associated with the creation of PV. Both information and service quality positively influence e-Gov use, however system quality appears not to

have any significant influence on e-Gov use, presumably because technology is now sufficiently advanced for functionality to be normalised as a user expectation.

Addressing a gap in the literature concerning what constitutes success in e-Gov initiatives, this study suggests both use of e-Gov services and associated user satisfaction, which is derived from accessing these services, are important. However, while both considerations are central to success, there is a spectrum in PV creation that ranges from cost-based operational efficiency to user-centred functional effectiveness and to increased public participation in social and democratic processes. These three conditions make up a novel PV impact framework, with two enabling attributes, trust and transparency, also identified.

Methodologically, the study identifies a user-centric policy and practice framework for practitioners to direct policy efforts towards e-Gov adoption and creation of PV. The framework includes three tensions that arguably sustain the e-Gov paradox. The first tension is ad-hoc policy which exists due to the lack of an enabling environment, and in this study is characterised by bureaucratic inertia and decision-making stovepipes or silos. A second tension is the tendency for policy to be decoupled from implementation due to lack of an integrating e-Gov practice framework to bridge the digital divide(s). This is evident in the variable access to infrastructure and high cost, as well as varying urban/rural needs, digital literacy and language competence, with a significant majority of users being more comfortable using a local language rather than English, the official language of government. A third tension is the tendency for e-Gov practitioners and the Digital Pakistan Policy (DPP) to be blind to identifying and meeting user or demand-side needs. Key enablers of this user-centric view of PV are design-based trust and the establishment of a system of redressal.

In summary, there are direct and indirect factors that drive public value creation, with the core need identified for governments is to shift from a provider-centred focus to a citizen-centred or user focus. The e-Gov policy and practice framework can help practitioners and researchers alike to both inform and examine policy efforts related to e-Gov uptake and PV creation based on measuring what matters most for the user. These study findings are likely to be of keen relevance to decision-makers in the Government of Pakistan and other emerging economies wishing to bridge the e-Gov paradox noted in literature.

Key words: e-Government, e-Gov adoption, technology readiness, digital-divide, impact, public value

STUDENT DECLARATION

"I, Shahid Nishat, declare that this DBA thesis entitled *E-Government: Antecedents to Technology Adoption and Creating Public Value in Pakistan* is no more than 65,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. The thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

I conducted my research in alignment with the Australian Code for the Responsible Conduct of Research and Victoria University's Higher Degree by Research Policy and Procedures.

All research procedures reported in the thesis were approved by the VU Human Research Ethics Committee - HRE19-168.

Signature **Date** 07-Feb-2022

ACKNOWLEDGEMENTS

First and foremost, I would like to thank Almighty Allah, who gave me the will, strength, and good health to complete this doctoral study.

This thesis is result of great and immense support and guidance given by my Principal Supervisor, Dr Keith Thomas. I am grateful for his commitment, expertise, and insightful feedback on the work presented here. I must also acknowledge that Dr Thomas is not just an academic supervisor, but also a mentor and I feel privileged to have worked with him. I also thank my co-supervisor Dr Shahnaz Naughton for her support in this research process.

I would like to thank the Australian Government for providing me with the Research Training Program scholarship that enabled me to pursue this research, and furthermore I would also like thank Victoria University for providing me with a research stipend scholarship.

I want to also acknowledge Professor Stephen Burgees for his guidance during my research journey, especially his valuable feedback during the initial phases of this study. I also take this opportunity to thank Victoria University research support staff, Dr Christine Millward, for the support provided during survey design and quantitative analysis. I would also like to thank Philip Holmes-Smith (OAM) of the Australian Consortium for Social and Political Research Inc (ASCPRI) for his guidance on Structural Equation Modelling (SEM). It helped greatly in the quantitative analysis phase.

Doctoral studies tend to be a lonely endeavour, however, the HDR group routinely organised by Dr Keith Thomas not only provided an opportunity to present my ideas and receive feedback from a diverse audience; it was also a great platform for observational learning. I thank all the members of this HDR group for their feedback through the course of this study. I am also thankful to Philip Thomas for editing and proof reading this thesis.

I owe my deepest gratitude to my parents for their unconditional love and prayers. I would not have been here if I was not standing on someone else's shoulders, and my parents have certainly been these shoulders. Most importantly, this acknowledgement will remain meaningless if I do not recognise the love, support, and sacrifice of my wife, Tehmina and my kids, Hamza, Hassaan and Rayyan. Thank you for being there when I needed you the most. I dedicate this work to my parents, my wife, and my children.

PUBLICATION

The following paper based on work by the author during this DBA journey was presented at a peer-reviewed international conference.

Nishat, S. and Thomas, K. (2021), E-Gov adoption: Determining the Relative Effect of Individual and Technology Characteristics, Birmingham, London, *British Academy of Management Conference*, 31st August – 3rd September 2021.

GLOSSARY

Acronym	Terminology
ADB	Asian Development Bank
AMOS	Analysis of Moment Structures – A software used for SEM analysis.
AVE	Average Variance Extracted
CB-SEM	Co-variance Based (CB)-SEM
CF	Conceptual Framework
CR	Composite Reliability
CSS	Central Superior Service –appoints civil-service officers that form the bureaucratic apparatus of the country
DC	Deputy Commissioner
DGA	Digital Government Authority – Saudi Arabian government authority constituted to formulate Saudi Arabia's digital strategy.
DIRBS	Device Identification, Registration and Blocking System
DOI	Diffusion of Innovation Theory
DPP	Digital Pakistan Policy
DTA	Digital Transformation Agency- An Australia's that gives policy leadership to the government on digital service delivery (DTA 2021)
ECAC	Electronic Certification and Accreditation Council
EGD	Electronic Government Directorate
EGDI	E-Gov Development Index
E-Gov	E-Government services provided using ICT
ERP	Enterprise Resource Planning
FBR	Federal Board of Revenue
FFA	Force Field Analysis (supporting change – devised by Kurt Lewin in the 1940s)
FGDC	Federal Government Data Centre
GDP	Gross Domestic Product

GOP	Government of Pakistan
G2B	Services between government and businesses (G2B)
G2C	Services between government and citizens (G2C)
G2E	Services between government and employees (G2E)
G2G	Services between government departments (G2G)
HDI	Human Development Index
HEC	Higher Education Commission
HOC	Higher-order Constructs (allows constructs at a higher level of abstraction)
IaaS	Infrastructure as a service (part of cloud-based services)
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
ITU	International Telecommunication Union
LVS	Latent Variable Scores
MD	Mahalanobis Distance
MGA	Multi-Group Analysis (for analysing heterogeneity among groups)
MM	Motivational Model
MMR	Mixed Methods Research
MPCU	Model of PC Utilization
NADRA	National Database and Registration Authority
NITB	National Information Technology Board
NPM	New Public Management
NTISB	National Telecommunication Information Security Board
OECD	Organisation for Economic Co-operation and Development
PaaS	Platform as a Service (part of cloud-based services)

PCP	Pakistan Citizen Portal
PEOU	Perceived Ease of Use
PITB	Punjab Information Technology Board
PKI	Public Key Infrastructure
PLS	Partial Least Square
PLS-MGA	Partial Least Square Multi-Group Analysis
PLS-SEM	Partial Least Square - Structural Equation Modelling
PTA	Pakistan Telecommunication Authority
PU	Perceived Usefulness
PV	Public Value (impact / net benefits from accessing e-Gov services)
SaaS	Software as a service (part of cloud-based services)
SCT	Social Cognitive Theory
SDG	(UN mandated) Sustainability Development Goals
SECP	Securities and Exchange Commission of Pakistan
SEM	Structural Equation Modelling
SES	Socio-Economic Status
SPSS	Statistical Package for Social Sciences
TA	Technology Adoption
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TR	Technology Readiness
TRA	Theory of Reasoned Action
TRAM	Technology Readiness Acceptance Model
TRI	Technology Readiness Index
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UPS	Uninterrupted Power Supply

US	User satisfaction (linked to uptake and PV)
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor
WB	World Bank
WEF	World Economic Forum

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Intentionally left blank

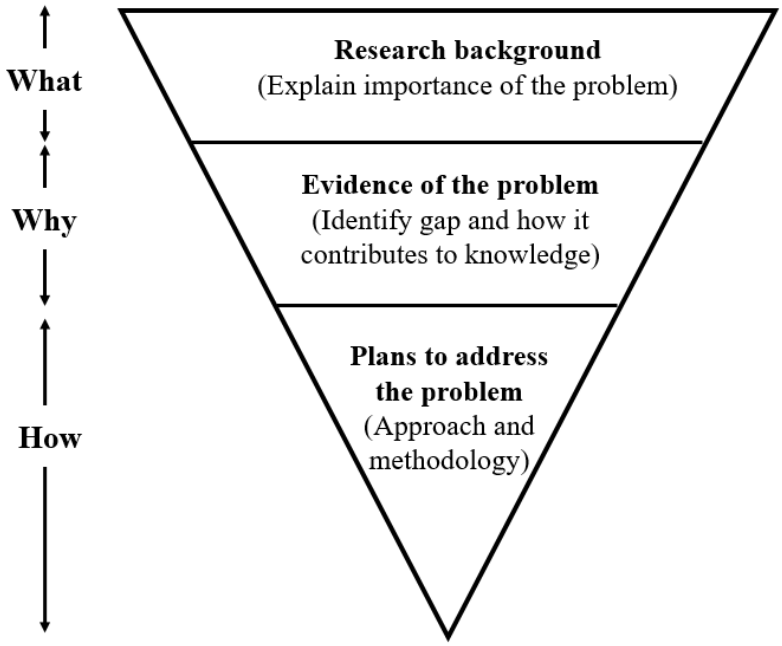
CHAPTER 1: STUDY OVERVIEW

1.1 Introduction

This chapter is an overview of the study. It first sets out the aim and objectives of the research based on theory and practice gaps identified in e-Government adoption and the emerging concept of public value (PV). The chapter then outlines theoretical underpinnings of the study and the contribution intended to be made to the body of knowledge on this topic. Essentially, this chapter answers the *what*, *why* and *how* questions, i.e. what is the research issue, why it is important and how it is addressed in the subsequent chapters of the thesis.

To answer these questions the chapter is organised as recommended by Radhakrishna (2008), who suggests viewing the first chapter of a thesis as a cone – where the top part of the cone represents the overall topic, the middle signifies the research gap and the tip symbolises the specific problem a researcher aims to address (Figure 1.1). Considering this, section 1.2 provides the background and context of the study; section 1.3 identifies the research problem; and section 1.4 offers a way forward on how this issue is addressed.

Figure 1.1: Introduction chapter of thesis based on (Radhakrishna 2008)



1.2 Research Background (What)

Information and Communication Technology (ICT) is seen as an enabler that can transform the way people live and work, and how organisations do business (OECD 2019). Recognising these transformational opportunities, governments in developed and emerging

economies alike, are investing in information technologies to transform the way they perform their functions with an aim of increasing efficiency, transparency and citizen participation (Gable, M 2015). This use of ICT-enabled tools by government is commonly referred as e-Government or e-Gov and consists of four distinct types of digital interactions between: government and citizens (G2C); government and businesses (G2B); government and employees (G2E); and government departments (G2G) (Carter & Bélanger 2005; United Nations 2014). This study focuses on G2C interactions since firstly, citizens are the fundamental actor in e-Gov and benefits of e-Gov services cannot be realised unless these are adopted by citizens (Jacob et al. 2019). Secondly, citizen adoption is still considered as a challenge, especially in emerging economies, principally due to a lack of trust in governments (Rana et al. 2017; Suri 2017).

A connected issue, mostly reported in emerging economies, is the reported high failure rates of e-Gov projects (Baheer, Lamas & Sousa 2020; World Bank 2016). According to earlier research, up to 50 percent of projects were categorised as partial failures and 35 percent as total failures (Heeks 2003a). This raises a related question, what constitutes success in an e-Gov initiative? Literature suggests conventional approaches to evaluating e-Gov projects focus on cost efficiencies – that is, saving money by changing a product or process (Cordella & Bonina 2012). The weakness in this approach is that it overlooks broader socio-economic considerations and associated benefits of e-Gov initiatives (Agbabiaka & Ugaddan 2016). This weakness can be overcome by using a Public Value (PV) approach to evaluate e-Gov projects (Scott, M, DeLone & Golden 2016), which measures success by user perceptions of value created by the respective ICT enabled systems.

PV is the value or significance recognised by citizens for their experience of public service and government policies (Moore 1995). This concept is important as it defines a new way of evaluating a government service – along a spectrum that ranges from functional efficiency, to effectiveness and finally the enabling of social values such as inclusion, democracy and (societal) participation (Bryson, Crosby & Bloomberg 2014; Stoker 2006). E-Gov initiatives also help create PV by enabling organisational capabilities, such as public service delivery capability and public engagement capability (Pang, Lee & DeLone 2014). In existing literature, however, only a limited number of government-to-citizens (or G2C) studies appear to evaluate e-Gov services in terms of PV (Agbabiaka & Ugaddan 2016; Pang, Lee & DeLone 2014; Scott, M, DeLone & Golden 2016). This is the context for the Digital Pakistan Policy (DPP). Devised by the Government of Pakistan (GOP) in 2018, the DPP envisions widespread diffusion of e-Gov among citizens and an equitable participation

of its citizens in the social democratic process (Government of Pakistan 2018a). The key goals of the DPP are as follows:

- Promote e-Governance and bridge the digital divide. Enhance efficiency and ensure transparency by implementing e-Gov initiatives at different tiers of the government.
- Youth and women empowerment through equitable socio-political participation.
- Encourage technology adoption in key socio-economic sectors such as health and education.
- Leverage the benefits of e-Gov to support implementation of UN Sustainable Development Goals (SDGs), such as improving access to health and social services, and reducing inequality and supporting gender equality.

1.3 Research Problem and Gap (Why)

The Government of Pakistan has for nearly two decades invested in policy efforts to promote e-Gov. The first concrete step towards e-Gov was taken in 2002 with the establishment of the e-Gov Directorate or EGD (Ahmad, Markkula & Oivo 2012). Subsequently, the National IT Board (NITB) was established in 2014 and then in 2018 came the DPP, devised by the government to give strategic direction to e-Gov practice in the country. That aside, e-Gov initiatives have attracted substantial national and international funding. The World Bank, for example, has funded over USD 4 billion for e-Gov projects since the year 2000 (World Bank 2021a). Despite these policy and investment efforts, low adoption of e-Gov is reported (Pérez-Morote, Pontones-Rosa & Núñez-Chicharro 2020; Rehman, Kamal & Esichaikul 2016). A recent report by UN also provides evidence of low adoption of e-Gov in Pakistan as the country was ranked 153rd among 193 UN member states in terms of e-Gov development (UN 2020b).

Aside from low adoption of e-Gov services in Pakistan, there appears that according to this researcher's best knowledge, no study has yet examined e-Gov in the country using a PV-based approach to assess impact. As Ridgeway (1956), a contemporary of Peter Drucker, warned there are dysfunctional consequences of measurement as what gets measured gets managed, even if it is pointless to measure and manage, and even if it harms the purpose of the organisation (Ridgway 1956). To measure e-Gov impacts, this study adopts a PV-based approach to measure user perception of e-Gov impact. An ideal outcome from this study is a citizen-centric policy and an e-Gov practice framework based on users' (citizens) need to map actions against national goals that may have been achieved. The study seeks to create a better understanding of the factors that influence e-Gov adoption and evaluate impact

using PV. The technology artefact employed is e-Gov applications, usually accessed through mobile devices. While this study looks at Pakistan, it is anticipated that findings may be equally relevant to e-Gov initiatives in most other emerging economies.

1.3.1 The e-Gov Paradox

Governments around the world have been investing considerably in electronic or what is more lately being called "digital government" initiatives (Savoldelli, Misuraca & Codagnone 2013). Developed nations are reportedly leading the way in ICT diffusion and associated outlays. For example, the Australian government spends around AUD 5 billion annually on ICT, which includes investments on government infrastructure and services like myGov and e-Tax (Deloitte 2015). Similarly, the UK government's digital marketplace is reported to have spent GBP 1.3 billion in 2017-18 (European Commission 2019).

Spending by countries that are emerging economies are largely steered by internal resources, as well as global funds originating from development organisations. Over the last two decades, for example, the World Bank (WB) alone has funded projects worth over USD 83 billion to the so-called emerging economies,[1] with financial commitments of another USD 26 billion to be spent in the next two years (World Bank 2021a). Despite these substantial investments, adoption of e-Gov services is reported as persistently low (Jacob et al. 2019; Pérez-Morote, Pontones-Rosa & Núñez-Chicharro 2020; Rana et al. 2017).

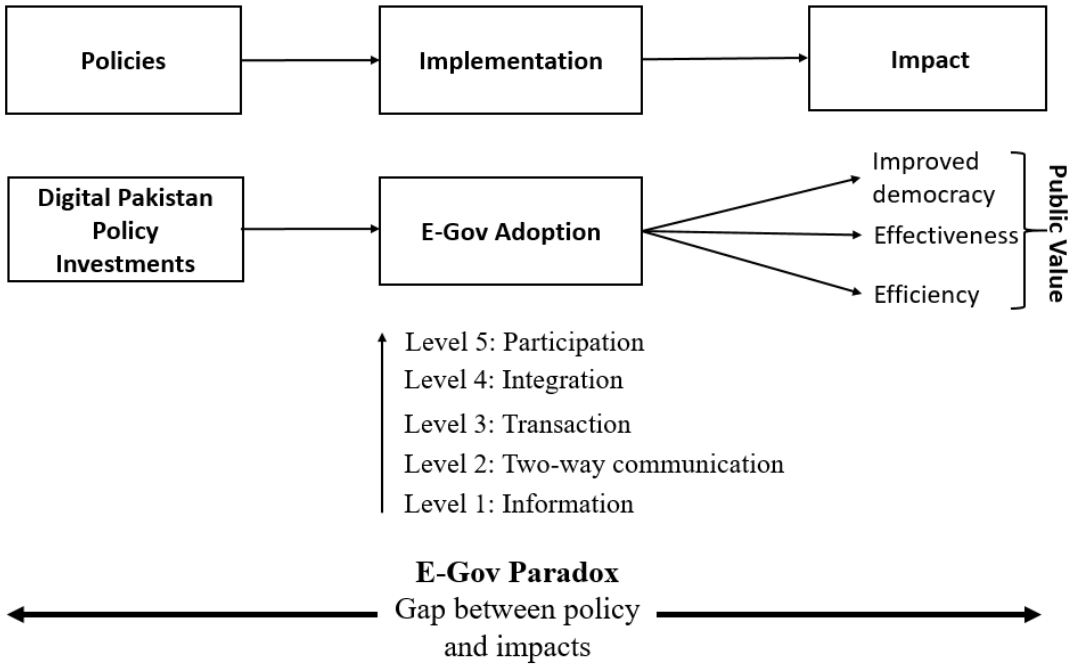
There is also a disparity noted between the investment made and expected impacts in terms of efficiency, lower costs, limited public participation and even public value. This disparity is described as the e-Gov paradox (Castelnovo 2010; Knox & Janenova 2019a) that is reportedly more chronic in emerging economies (Knox & Janenova 2019a), where reportedly eighty (80) percent of projects completely or partially fail to achieve their objectives (Gunawong & Gao 2017). The World Bank (2016) has raised similar concerns when noting many e-Gov projects are unable to achieve their intended outcomes, noting less than 20 percent of such projects are seen as successes. The WB attributes this failure to different factors such as political and regulatory process gaps, rigid procurement rules in the public sector and a lack of understanding of country context. In a related study concerning the failed Smart ID card project in Thailand, its failure was linked to internal and external factors with the primary reason being a cumulative failure to create and maintain the actor-

[1] While the definition is not universally agreed, an **emerging economy** is the **economy** of a **developing** country (a low industrial base / relies on agriculture, and a low human development index (HDI) that is becoming more engaged with global **markets** as it grows.

network. It was recommended to allow e-Gov systems to evolve according to ICT readiness and local adoption considerations (Gunawong & Gao 2017).

Broadly, the paradox signifies two fundamental issues: first, a tendency for low adoption of e-Gov services; and second, a trend to not achieve the desired and anticipated impacts (Castelnovo 2010; Otieno, Omwenga & Waema 2016; Savoldelli, Codagnone & Misuraca 2014). These two issues are illustrated in Figure 1.2 as a 3-stage conceptual framework that comprises: *policy, implementation* and *impact*. The main objectives of the (DPP) policy were discussed earlier. Implementation and impact issues are discussed subsequently.

Figure 1.2: The e-Gov paradox (gap between policy and impact)



1.3.2 E-Gov Adoption

In general, developing or emerging economies are reported as tending to lag in technology adoption, particularly in the public sector (Alateyah, Crowder & Wills 2012; Carter & Bélanger 2005; Gupta & Maurya 2020; Reddick 2005). Although technological advances have improved people's access to ICT services, e-Gov initiatives in developing economies face many barriers and are deemed as still in an early stage of adoption (Rana et al. 2017). The UN in various reports has also echoed similar views that developing and emerging economies lag far behind in the adoption of new technologies (UN 2018b). Asian Development Bank (ADB) identified that this sluggish pace was partially due to regulatory impediments, institutional issues such as lack of clear policies, a digital divide and

individual reluctance to accept new technologies due to educational, social or language barriers (Kuldosheva 2021).

As an emerging economy, Pakistan is hampered by many of the challenges identified above. The first concrete initiative towards e-Gov was taken in 2002 with the establishment of the Electronic Government Directorate (Ahmad, Markkula & Oivo 2012). However, notwithstanding the near two decades of policy efforts and over 85 percent tele-density – a traditional measure of telecom development defined as number of telephone users per hundred inhabitants (ITU 1998) – uptake of e-Gov services remains low (Haider, Shah & Chachar 2017). Low levels of adoption are also evident in various UN reports, with Pakistan ranked below global and regional average in terms of an e-Gov development index and an e-participation index. Both of these indices are part of UN e-Gov survey, which acts as a global benchmarking tool on e-Gov for governments and practitioners (UN 2018b).

Part of the uptake issue is an implicit presumption by governments that citizens will prefer and adopt e-Gov services rather than traditional ways of delivering public services (Westjohn et al. 2009). Another consideration is that not all citizens are ready to embrace the desired technological service (Rojas-Méndez, Parasuraman & Papadopoulos 2017). These issues collectively signify the element of technology readiness (TR) as a cornerstone of adoption. Unsurprisingly, also, some segments of the population tend to avoid using technology due to 'technophobia' and this refers to an anxiety over using new technology (Kotze, Anderson & Summerfield 2016).

To explain adoption, various academics and practitioners have used different theories and models such as Diffusion of Innovation by Rogers (2010), Technology Acceptance Model (TAM) by Davis (1989), Information System (IS) success model by (Delone & McLean 2003) and Unified Theory of Acceptance and Use of Technology by Venkatesh et al. (2003). These theories have garnered seminal importance and employed in varying contexts such as e-commerce, cloud computing, enterprise resource planning (Gangwar, Date & Ramaswamy 2015; Xie et al. 2017). However, these theories largely explain adoption by reference to characteristics of technology, such as perceived usefulness, perceived ease of use, complexity, compatibility, social influence, etc., or by examining the design or quality dimensions associated with the technology artefact under examination (Westjohn et al. 2009).

Technological considerations aside, as individuals are a fundamental actor in adoption, it is equally important to investigate the interaction between technology characteristics and the

individual (Parasuraman & Colby 2015). So far there have been few attempts to jointly study individual and technology characteristics (Lin, C, Shih & Sher 2007; Meuter et al. 2005) and the outcome from these studies has been to suggest a need for a more comprehensive investigation of variables relevant to adoption at an individual level (Parasuraman & Colby 2015). Although some theories and models such as TAM explain adoption as a function of individual characteristics, the theoretical basis is the Theory of Reasoned Action (TRA) that states that behavioural intention is shaped by beliefs and attitudes (Fishbein & Ajzen 1977). However, there is cause to also examine antecedents – how these beliefs and attitudes are formed, and this is an emerging area of interest to many researchers. The construct of technology readiness is one such attitudinal variable (Westjohn et al. 2009) and according to some researchers, TR is instrumental in fomenting behavioural intention (Lin, J-SC & Hsieh 2007).

Viewing the above-mentioned issues, the fact is that despite the emergence of many technology-based offerings, very little is known about factors affecting users who adopt these services. Moreover, what is known largely relates to developed countries (Rojas-Méndez, Parasuraman & Papadopoulos 2017). For this reason e-Gov adoption in the context of Pakistan is a fundamental issue addressed by the first research question of this study:

> *Research Question (**RQ**) 1: What is the interplay between individual and system characteristics on adoption of e-Gov services in an emerging economy like Pakistan?*

1.3.3 Impact Assessment

Governments around the world have been using e-Gov as a means to improve public service delivery, promoting interactions between citizen and governments and improving the efficiency of public organisations (Gauld, Goldfinch & Horsburgh 2010; Lyzara et al. 2019). Therefore, it is apt to state that e-Gov aims to create an enabling environment so that services are more accessible, more reachable, more transparent and cost-effective (Beynon-Davies 2005; Jaeger, PT & Thompson 2003). Another view is that one of the fundamental aims of e-Gov is to create value for citizens (Karunasena & Deng 2012). In a process sense, these benefits are outputs of an e-Gov adoption process and to gauge the true success of an e-Gov adoption process, it will be only appropriate to examine if the intended outputs – that is, if public value is realised. This view is endorsed by Scott, M, DeLone and Golden (2016), who suggest success of an e-Gov system can be measured by perceptions of value created

by the system in the view of citizens. Thus, in this study adoption and impact will both be examined to form a more complete picture of this process.

Secondly, it is also important to identify dimensions of success in the study, as approximately 70 percent of change projects like e-Gov initiatives fail (Burnes 2015; Burnes & Jackson 2011; Senturia, Flees & Maceda 2008). In a specific earlier study on e-Gov development, Heeks (2003a) suggested that most e-Gov initiatives in developing countries fail, with 50 percent of them categorised as partial failures and 25 percent as total failures. These are worrying statistics considering the fact that developing countries already face considerable limitations in terms of resources and cannot afford failure in such resource intensive projects (Dada 2006).

Against this backdrop the concept of public value or PV has gained significant importance when evaluating the success of e-Gov services (Twizeyimana & Andersson 2019b). PV first emerged as a result of a seminal study by Moore (1995). Since then, several studies have appeared especially in public administration literature (Williams & Shearer 2011; Zhang, Puron-Cid & Gil-Garcia 2015). PV as a concept is concerned with the value or perceived significance recognised by citizens of their experience of government-based services and government policies (Moore 1995). PV defines a new way of evaluating impact or success of government services and Government-Individual interactions in terms of efficiency, effectiveness and social values (Bryson, Crosby & Bloomberg 2014; Stoker 2006). Examining the success with a public value approach is however sparse in literature (Scott, M, DeLone & Golden 2016). Examining the impact in terms of perceptions of public value is important, particularly as internet-based services are able to be personalised according to individual requirements of users and so invites varied perceptions of value (Scott, M, DeLone & Golden 2016). This makes the notion of measuring success with a PV approach complicated, as a singular Information System can be viewed differently by different people, depending upon their need and usage (Teo, Srivastava & Jiang 2008).

That said, most of the studies that measure impact of technology-based systems appear to focus on workplace environments (Petter, DeLone & McLean 2008). There is some research on the specific domain of e-Gov with a focus either on employees (Gable, GG, Sedera & Chan 2008) or e-Gov web sites (Connolly, Bannister & Kearney 2010; Teo, Srivastava & Jiang 2008). However, not enough research is reported on ascertaining e-Gov success from the perspective of citizens (Berntzen 2014; Scott, M, DeLone & Golden 2016). Accordingly,

there is a need identified for research that focuses on public value of e-Gov from the citizen's perspective. The second research question follows:

*Research Question (**RQ**) 2: How can governments support adoption and creation of PV in an emerging economy such as Pakistan?*

1.3.4 Research Objectives

The research aims to critically examine uptake of e-Gov services and evaluate its impact in terms of PV. This is in line with policy objectives of Government of Pakistan (GOP) to create an e-Gov ecosystem as stipulated in the DPP (Government of Pakistan 2018b). Objectives relating to the two research questions above are, respectively:

RQ1:

- **RO 1.1:** Examine the interplay between individual and system characteristics on adoption of e-Gov services (*in terms of use and user satisfaction*).
- **RO 1.2:** Examine the success of e-Gov services from a citizen perceptions point of view measured in terms of public value dimensions.

RQ2:

- **RO 2.1:** Identify the key issues that help/ hinder creation of public value.
- **RO 2.2:** Identify enabling and constraining factors that influence citizen adoption of e-Gov and creation of PV in an emerging economy like Pakistan.

And a summative objective related to both RQ1 & 2

- **RO 2.3:** Develop a policy and practice framework to support successful adoption and creation of PV in an emerging economy

By achieving these stated research objectives, this study will not only support the objectives of the GOP, but the findings may also help improve the implementation of e-Gov projects in other emerging and developing economies.

1.3.5 Contribution to Knowledge and Significance

Research in e-Gov is a relatively new (Coursey & Norris 2008). The first use of the term electronic government can only be traced back to 1993 in the US National Performance Review (Heeks & Bailur 2007). According to Lofstedt (2012) the subject area is not yet

mature and needs greater critical investigation. Sluggish citizen adoption of e-Gov services, especially in emerging economies is commonly a significant challenge and requires further research (Al-Hujran et al. 2015; Jacob et al. 2019; Rana et al. 2017). This study attempts to explain adoption as a result of a combination of technology and individual characteristics (Parasuraman & Colby 2015) and as relevant literature suggests, comparatively few studies have taken such an integrative approach (Lin, C, Shih & Sher 2007; Meuter et al. 2005; Rana et al. 2017). This study promises to yield new insights into the e-Gov adoption process, especially in the context of emerging economies.

A further potential contribution of this study is the attempt to solve the reported e-Gov paradox of huge investments without any convincing evidence on impact. The proposed PV theory-based approach to examine impact has only been used by a few studies on the subject of e-Gov (Scott, M, DeLone & Golden 2016), with none evident in Pakistan. This study will seek to fill this void.

Additionally, from a practitioner's view, this study will be of keen relevance to GOP as it directly aids the objectives of IT enablement and the wider adoption of e-Gov services at all levels of the government per DPP objectives (Government of Pakistan 2018b). The objectives are reinforced by the UN, which identifies e-Gov as providing an enabling environment for the ambitious road map to achieve sustainable development goals (SDGs) devised by the UN (2016). At the heart of the 17 UN SDGs is an urgent call to all countries, developed and developing, to end poverty and other deprivations, as well as strategies to improve health and education, reduce inequality and improve economic growth. A key element in capacity building (post-2015 Agenda and Rio +20 follow-up processes) to strengthen and maintain the ability for states and societies, is to address the technology divide by designing and implementing strategies that minimise the negative impact of social, economic and environmental crises and related challenges.

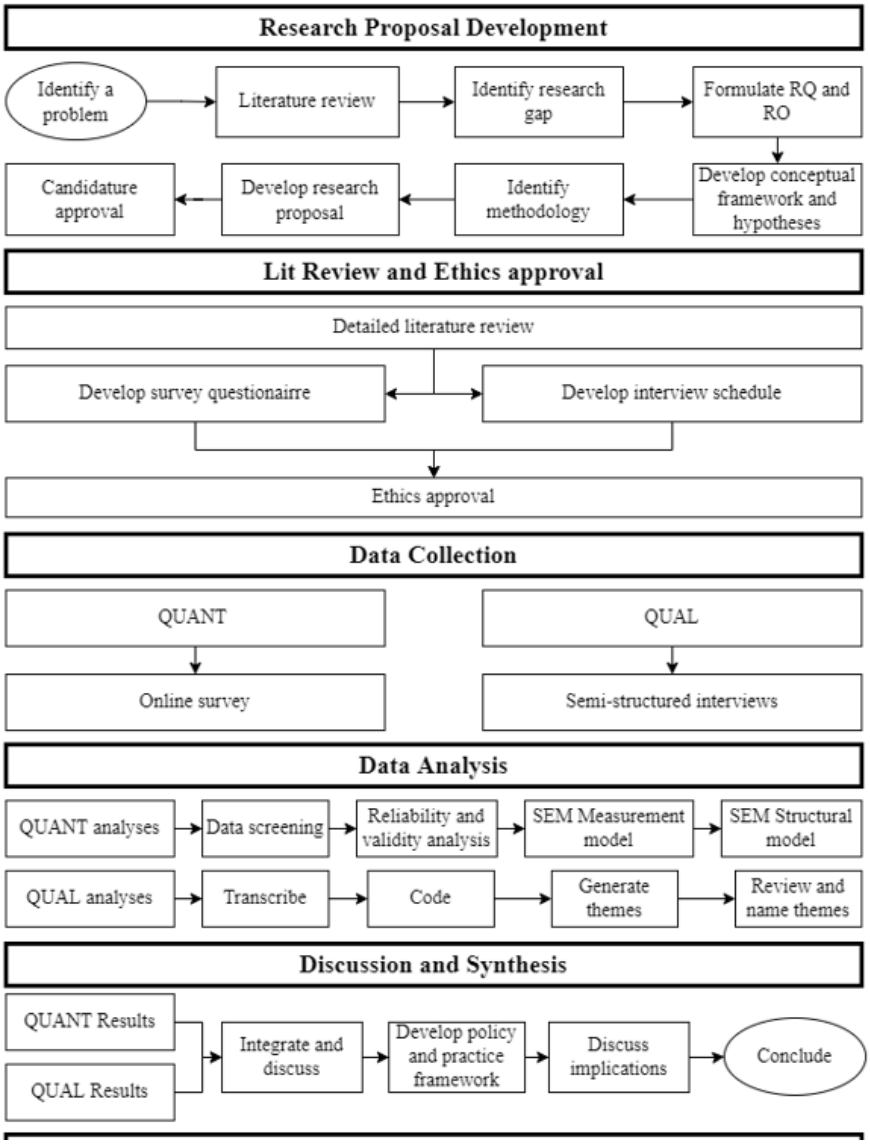
The study will seek to provide insights for policy-makers to improve adoption of e-Gov services and raise Pakistan's e-Gov ranking and capacity to achieve the various UN SDGs. Further, since most e-Gov initiatives are currently reported as being not able to achieve the desired objectives (Burnes 2015; Burnes & Jackson 2011; Senturia, Flees & Maceda 2008), this study will seek to provide insights for improved adoption and overall success of such initiatives. Finally, the integrated policy and practice framework developed because of this study will be another novel contribution for practitioners and academicians alike to direct policy efforts on relevant areas to enhance e-Gov adoption.

1.4 The Research Process (How)

A first step in the study was to conduct an extensive literature review of the field of e-Gov. This review identified key insights and gaps in existing knowledge both at a system and individual level, as well as in terms of impact and related varying perceptions of PV.

Figure 1.3 below illustrates the various steps taken in the research process. Key steps in this process include formulation of research questions and objectives, the proposal development and approval process, data collection and analysis employing both quantitative and qualitative methods. A further element in terms of quality assurance inherent in the University doctoral study process were three quality hurdles: proposal approval based on a review by an academic and external members panel, a mid-candidature panel and a pre-submission panel that in order reviewed and critiqued study progress and offered guidance on approach and subsequent analysis.

Figure 1.3: The research process



1.4.1 Research Approach and Methodology

The study aims to first investigate antecedents of technology adoption and second identify impacts of e-Gov initiatives in term of the public value (PV) approach. The research used a mixed methods approach to achieve the research objectives. A quantitative (QUAN) approach helped give the study the validity to generalise the findings, while the qualitative (QUAL) aspect provided richer and deeper insights to understand the problem. The supporting conceptual model for the study is adapted from the IS success model devised by Delone and McLean (2003); twelve hypotheses are developed based on existing literature.

The QUAN approach was used to collect data from citizens, whereas QUAL methods were used to get managerial insights on adoption and PV creation. The QUAL approach was based on two sources of data. First, semi-structured interviews were conducted with public sector e-Gov managers and these discussions made it possible to understand and interpret the e-Gov phenomena by making sense of people's lived experiences (Gill et al. 2008). The second source of QUAL data was open-ended questions included in the citizen survey questionnaire. Open-ended questions enabled respondents to express their ideas more freely and allowed new and richer ideas to emerge. Qualitative data was coded, organised and categorised to build themes and interpret meanings of people's experiences. QUANT data was collected from citizens using an online survey and subsequently analysed using the multivariate technique of Structured Equation Modelling (SEM).

1.5 Thesis Structure

This thesis comprises seven chapters and they are summarised below.

Chapter One is an overview of the study. It details the background to the topic, the aims, research questions and subordinate research objectives. This chapter also details the prospective academic contribution and practical significance of the study, as well the overall research process and structure of the thesis.

Chapter Two provides a detailed literature review relevant to the study and discusses the research need in view of the extant literature. Different electronic government initiatives undertaken by the Government of Pakistan are discussed. It then discusses different stages of e-Gov development and analyses the challenges in global, regional and local contexts. Technology adoption theories are discussed and the rationale for the e-Gov is provided. Towards the end of the chapter different approaches to assess e-Gov are discussed and a rationale for the PV-based approach to assess impacts is provided.

Chapter Three comprehensively discusses the theoretical frameworks with a focus on theories supporting this study. The conceptual model based on IS success model, technology readiness index and PV theory is developed and hypotheses are articulated.

Chapter Four explains the research methodology and this chapter begins by introducing different research paradigms and reflects on the research framework. The process of data collection and development of survey instrument is subsequently discussed. Different research approaches are introduced and the rationale for the approach taken is justified.

Chapter Five reports the results and discusses findings for the quantitative phase of the study. At the beginning of the chapter descriptive statistics are discussed to give an overview of the frequency distribution and demographic profile of the participants. In the latter half of the chapter the quantitative data analysis process and SEM modelling are discussed. Towards the end of the chapter results of hypothesis testing are detailed and implications discussed.

Chapter Six discusses findings of the qualitative phase of the research. The process of qualitative data collection and thematic analysis is discussed. Key findings from the thematic analysis are presented. Enabling and constraining factors for e-Gov uptake and PV creation are discussed using a framework of Force Field Analysis. At the end of the chapter a policy and practice framework for e-Gov uptake and PV creation is discussed.

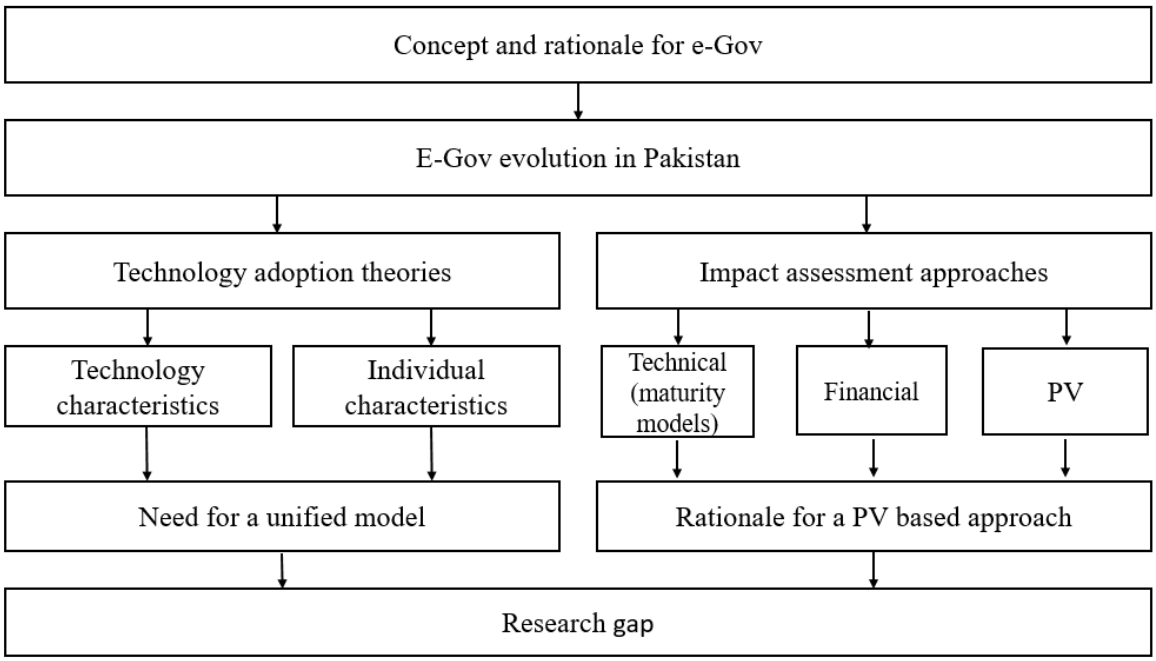
Chapter Seven provides the main conclusion of the study with reference to e-Gov adoption and creation of PV. The chapter summarises the main findings of the study, and offers a solution to the e-Gov paradox identified in the literature. Later, a revised conceptual framework based on quantitative and qualitative findings is presented. Policy and practice implications of the study are presented. The chapter concludes by discussing the study's limitations and way forward for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The previous chapter presented a picture of the overall research detailing the objectives and establishing a need for this study. This chapter will focus on broader e-Gov literature to further elaborate the concept, and it details e-Gov transformational activities in Pakistan. Later, the chapter will further expand the "why" question by placing the study in the context of existing literature and identify a research gap in the literature (see Figure 2.1). The chapter is organised around four broad themes: i) defining and elaborating the e-Gov concept; ii) highlighting e-Gov evolution in Pakistan; iii) discussing e-Gov adoption theories; and iv) addressing different e-Gov impact assessment approaches. Finally, through a synthesis of this discussion, a research gap in the existing literature is highlighted.

Figure 2.1: Conceptual flow of Literature Review Chapter



2.2 E-Gov: The Concept

E-Gov is often used interchangeably with terms like electronic governance, digital government, and other such terminology (Grönlund & Horan 2005). Generally, using the internet to provide information and services to citizens and businesses can be referred to as e-Gov (Norris, DF 2010; Tohidi 2011). E-Gov is a relatively recent term (Coursey & Norris 2008), with the first use of the term "electronic government" only traced back to 1993 in the US National Performance Review (Heeks & Bailur 2007). However, it has gained prominence recently with the penetration of internet throughout the world (Kumar, R,

Sachan & Mukherjee 2018). Some researchers suggest that e-Gov refers to the deployment of IT in the government, while for others it is just not correct to equate it to use of IT alone (Norris, DF 2010) and argue that governments have been using IT such as - computers and database management systems in their systems for a long while. Nonetheless e-Gov started gaining prominence in the new millennia (Moon, MJ 2002) with the gradual growth of internet. Importantly, e-Gov enabled governments to be "outward looking" and focus on citizens, businesses and other external agencies, whereas the traditional usage of IT has been "inward looking" since it has been primarily for internal systems like managing payrolls, accounting systems, etc. (Norris, DF 2010).

2.2.1 E-Gov Defined

There is no single clear definition of e-Gov. The many differences in defining the field are explained by the different priorities in government strategies (Alshehri & Drew 2010). For example, some scholars define e-Gov with a technological perspective, while others define the field with reference to intended outcomes like ease of access to information, improved efficiency and promoting citizens' empowerment. Table 2.1 tabulates some common definitions of e-Gov used by governments and leading organisations.

Table 2.1: E-Gov definitions

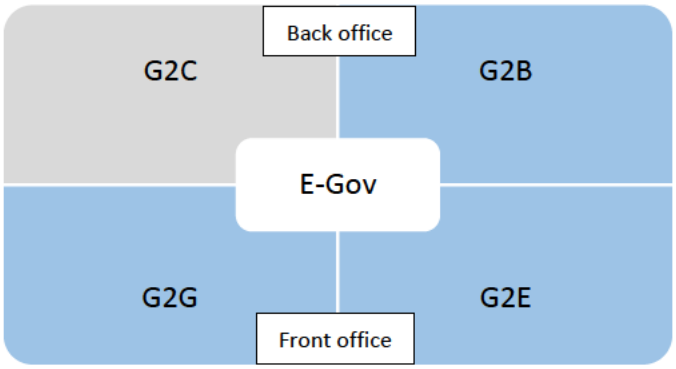
Organisation	Definition
OECD	*"E-government refers to the use of ICTs, and particularly the Internet, to achieve better governance"* (OECD 2014).
US Government	*"The use by the Government of web-based Internet applications and other information technologies, combined with processes that implement these technologies, to:* *a) enhance the access to and delivery of Government information and services to the public, other agencies, and other Government entities; or* *b) bring about improvements in Government operations that may include effectiveness, efficiency, service quality, or transformation"* (*Us E-Government Act,* 2002).
World Bank	*"Government-owned or operated systems of information and communications technologies (ICTs) that transform relations with citizens, the private sector and/or other government agencies so as to promote citizen empowerment, improve service delivery, strengthen accountability, increase transparency, or improve government efficiency"* (World Bank 2002).

Although various institutions may take different approaches to this field, it is important to note that, no matter whatever perspective one takes, the concept of e-Gov revolves around three broad goals, i.e. bringing efficiency to government processes, provision of improved services to citizens and better democratic processes (UN 2020a).

2.2.2 E-Gov Application and Classifications

E-Gov can be classified into four broad categories depending on the different stakeholders a government interacts with (Carter & Bélanger 2005). These categories are Government to Citizen (G2C), Government to Business (G2B), Government to Employee (G2E) and Government to Government (G2G). Often G2C and G2B are referred as "front office" interactions, while G2G and G2E are "back office" interactions (Rao 2011b). Figure 2.2 illustrates these classifications and highlights the focus of this study, i.e. G2C.

Figure 2.2: E-Government classifications



The G2C category is chosen for this study because citizen adoption is one the most vital areas for e-Gov development and e-Gov initiatives would be unable to achieve the intended outcomes, if these services are not adopted by citizens who generally are the major recipients (Jacob et al. 2019). The types of e-Gov interactions are elaborated in detail below.

2.2.2.1 Government to Citizen (G2C).

G2C services provide an electronic communication link between governments and citizens to interact with each other. These services are instrumental in citizen empowerment as they enable citizens to access public services without the limitation of time and space (Alshehri & Drew 2010). This is important because the fundamental goal of any government is to serve its citizens, naturally most of the e-Gov services come under this category (Alshehri & Drew 2010). A few examples of these services include electronic portals enabling citizens to apply for jobs or government benefits, renew their licenses, or identity documents and

passports etc. In Pakistan's context a pertinent example of G2C services is a web portal of National Database and Registration Authority (NADRA). It allows citizens to apply for the National Identity Card, Family Registration Certificates and Pakistan Origin Card for overseas Pakistanis, among many other online services.

2.2.2.2 Government to Business (G2B).

The G2B services signify digital interactions between the government and the business sector (Alshehri & Drew 2010). These services include provision of information and services for businesses. Its examples include e-procurement, filing of online tax returns, renewing business permits and licences, etc. These services are important because they enhance transparency, foster public private partnerships and are especially important in the context of developing economies (Hung et al. 2011). The Securities and Exchange Commission of Pakistan (SECP) web portal provides online services for incorporation and registration of new businesses in Pakistan, and this is an example of G2B service.

2.2.2.3 Government to Government (G2G).

Governments are traditionally hierarchical and work in tiers to execute their activities (Karacapilidis, Loukis & Dimopoulos 2005). It also increases the likelihood of working in silos, but G2G enables automation and centralises the business information spread across different government levels. This advantage generates the benefits of time and cost savings besides improving quality of service (Gregory 2007). G2G essentially allows online communications within and between different government departments (Alshehri & Drew 2010; Rao 2011b; Siddiquee 2016). An example of G2G service in Pakistan is the e-Office system, which integrates different departments into one online communication platform (NITB 2019).

2.2.2.4 Government to Employees (G2E).

The G2E model characterises the relationships between government and its employees, and subsequently, some scholars consider it as part of G2G (Alshehri & Drew 2010), while to some others it is a separate stream of e-Gov (Rao 2011a). With G2E services, employees can access organisational policies, receive training, apply for leave or check their salary records among other types of services (Alshehri & Drew 2010; Tang et al. 2011).

This study is focused on G2C because it is an important yet an under-researched area. This view is endorsed by many researchers who argue that supply-side issues have been the prime driver for academic research lately, yet demand-side issues have been overlooked (Rana, Dwivedi, Williams & Lal 2015). Its significance is elaborated by the fact that the whole idea

of e-Gov would fail if citizens who are the ultimate recipients of these services, do not adopt these services (Jacob et al. 2019). Therefore, viewing this importance and potential for demand-side research, this study will focus on G2C area.

2.2.3 Multi-Disciplinary Research Area

E-Gov is widely recognised as a multi-disciplinary or as an inter-disciplinary research domain that has gained significant importance in last few years (Chen, H et al. 2007; Molnar, Janssen & Weerakkody 2015; Scholl, HJ 2014; Yusuf, Adams & Dingley 2014). This field now spreads across management sciences, information systems, organisational science and public policy among various other disciplines (Bélanger & Carter 2012; Chen, H et al. 2007). This is evident from the fact that most cited articles on e-Gov have appeared in journals focusing on information systems (*Information Systems Journal*, *Journal of Management Information Systems*, *European Journal of Information Systems*), public administration (*Public Administration Review*), and government (*Government Information Quarterly*) (Bélanger & Carter 2012).

What this means is that researchers have used theories from various disciplines and this diversity has brought different perspectives to the research area (Molnar, Janssen & Weerakkody 2015). The inter-disciplinary nature of e-Gov is seen both as an asset and a challenge, because the different approaches adopted can lead to difficulties in understanding the research area (Molnar, Janssen & Weerakkody 2015; Scholl, HJJ 2008). Seeing this as an opportunity, the conceptual model devised for this study is based on information systems and public value theory. This interdisciplinary approach will make it possible to synthesise ideas from both research areas and is suited to answer the research questions for this study.

2.2.4 Rationale for E-Gov

Advancements in information technology and the growing ubiquitousness of the internet have enabled governments to transform their processes through e-Gov initiatives (Voutinioti 2013). G2C is often described as a key enabler to transform citizen's interactions with the government (Lindgren & van Veenstra 2018). According to the UN, e-Gov has the potential to support all 17 SDGs (UN 2016). Arguably, with the growing reliance on ICT in everyday activities, G2C interactions are similarly increasingly reliant on online technologies (Im et al. 2014). From a demand (users) perspective, there is growing expectation for improved efficiency (Chen, Y-C 2012), convenience (Venkatesh et al. 2016) and for transparency (Bearfield & Bowman 2017). What this means is that e-Gov simplifies the process of acquiring information, ensuring round the clock availability of government services and

improving public value (Bannister & Connolly 2014). Equally, from a supply-side perspective, governments are transforming the way of doing business by making large investments in IT systems (Ciborra 2009; OECD 2010; Rodríguez-Bolívar 2014) to reduce the costs of government services (Chun, Luna-Reyes & Sandoval-Almazán 2012; Gallo et al. 2014), make them more efficient (Rose, Persson & Heeager 2015) and encourage greater citizen participation (Gable, M 2015; Haller, Li & Mossberger 2011). Given these parallel and complementary objectives, successful G2C adoption has the potential to impact both governments and citizens, and this has great implications for theory and practice alike (Wirtz & Daiser 2018).

Besides these benefits, ICT in general is found to have a direct positive impact on socio-economic outlook of a country, as according to World Bank statistics, a ten percent increase in broadband internet penetration-which is fundamental requirement to enable e-Gov-translates into 1.38 percent increase in GDP growth in developing economies (Minges 2015). Realising this, governments, both in developed and emerging economies are taking keen interest in implementing e-Gov initiatives because of the benefits it promises for citizens and business alike (UN 2020b). Some common benefits of e-Gov both from supply and demand-side perspectives are tabulated in Table 2.2

Table 2.2: E-Gov benefits

Demand-Side (Front office)	Supply-Side (Back office)
▪ Communication (Yildiz 2007) ▪ Convenience and 24/7 availability (Wong, Hideki & George 2011) ▪ Costs savings (Wong, Hideki & George 2011) ▪ Time savings (Scott, M, DeLone & Golden 2016) ▪ Citizen participation (Scott, M, DeLone & Golden 2016) ▪ Transparency (Yildiz 2007)	▪ Coordination and standardization of information and services (Yildiz 2007) ▪ Build trust on government (Alzahrani, Al-Karaghouli & Weerakkody 2017) ▪ Efficiency – reducing the cost and time of delivering services (Rose, Persson & Heeager 2015) ▪ Transparency (Dorothea 2013; Venkatesh et al. 2016) ▪ Increased productivity (Rose et al. 2015)

These benefits cannot be achieved until e-Gov is adopted by citizens. In terms of uptake, Pakistan offers huge potential due its demographical profile. According to one United Nations human development report, Pakistan's 64 percent population is youth, which is the

largest ratio of young people since its formation in 1947 (UN 2018a). These numbers present a huge potential for the adoption of e-Gov in Pakistan, as the research suggests it is the youth who are most likely to adopt new technologies (Berkowsky, Sharit & Czaja 2017).

Further, e-Gov uptake greatly hinges on the level of ICT development, and as such the overall ICT infrastructure and regulatory environment in Pakistan has become increasingly liberal and conducive to e-Gov uptake (ITU 2018b; PTA 2018). Cellular tele-density has increased from a mere 2.9 percent in 2004 to 77.6 percent in 2019 (PTA 2018), and in general the telecommunications sector has witnessed remarkable growth due to de-regulation and competition (Imtiaz, Khan & Shakir 2015). These two factors provide a conducive environment for growth of e-Gov in Pakistan. However, Pakistan still ranks 148 in terms of e-Gov development amongst UN member states (United Nations 2018). This ranking suggests a need to examine factors that may be influencing and perhaps constraining adoption of e-Gov services throughout the country. In turn, these insights may help leverage the expected benefits of ICT, as well as help explain the impact of services on common citizens, which will also be examined in this study.

2.3 E-Gov Evolution in Pakistan

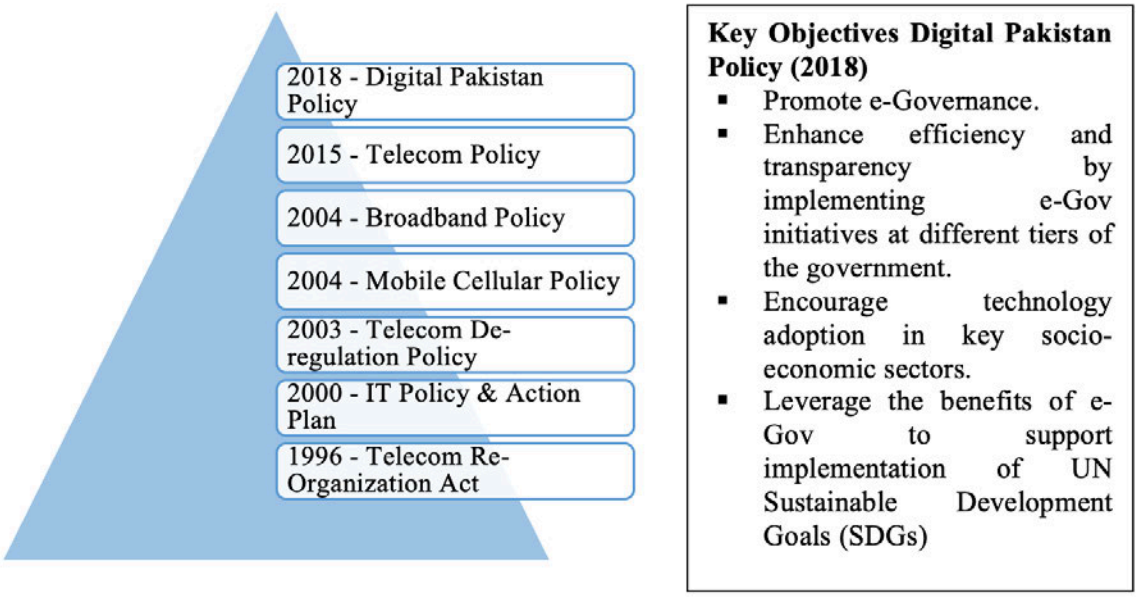
In Pakistan, e-Gov transformation is shaped by rules, regulations and laws framed by federal and provincial governments and some key organisations such as the Ministry of IT and Telecommunications (MoITT), National IT Board (NITB) and Pakistan Telecommunication Authority (PTA) (Nizamani 2019). The telecom sector in Pakistan was de-regulated in 1996 through the Telecommunication Re-organization Act 1996, and since then the sector has witnessed phenomenal growth (Choudhary et al. 2008). The Telecom Act provided a legislative cover for various regulatory and policy initiatives undertaken by the government. The country's first IT Policy and Action Plan was formulated in 2000. The policy encouraged e-commerce and private sector investments to steer growth and development of IT and telecommunications in the country.

Subsequently, in 2002 the Electronic Government Directorate (EGD) was established (Ahmad, Markkula & Oivo 2012). The directorate's main responsibility was to propose policies and recommendations for e-Gov projects in Pakistan. The directorate prepared an e-Gov strategy and 5 year plan, which was approved by National E-Government Council (Ahmad, Markkula & Oivo 2012). The salient features of the plan were to provide basic IT infrastructure to all government departments and connect them to Federal Government Data

Centre (FGDC). The plan envisioned providing common standardised application and an enabling environment for e-Gov services to grow (Government of Pakistan 2008).

In the same year (2002) another step towards digitisation and automation was taken by promulgation of an electronic transaction ordinance in 2002 when electronic communication and electronic signatures were finally recognised (Henriksen & Andersen 2008). To further spur the growth of e-Gov initiatives, the National IT Board (NITB) was set up in August 2014 at the federal level. The primary aim of NITB is to promote e-Gov programs in government departments (NITB 2019). More recently, with an aim to improve the digital infrastructure and success of e-Gov initiatives, the Government of Pakistan (GOP) issued its Digital Pakistan Policy in 2018. One of the main objectives was to promote digitisation in key socio-economic sectors, promote e-governance and to bridge the digital divide (Government of Pakistan 2018a). These developments and key policies formulated over last two decades are summarised in Figure 2.3.

Figure 2.3: Overview of ICT policies in Pakistan



2.3.1 Pakistan's E-Gov Progress in Global Perspective

United National E-Gov Development Index (EGDI) measures e-Gov development among 193 UN member states and ranks countries according to their e-Gov performance (United Nations 2018). EGDI is a composite index that measures a country's e-Gov capacities and is published by the United Nations Department of Economic and Social Affairs. The index depicts overall development of e-Gov and benchmarks the performance of member states relative to each other. It is composed of three sub-indices: i) online service index; ii) telecommunication infrastructure index; and iii) human capital index. All these sub-indices

are weighted equally to calculate composite EGDI. According to recent UN E-Gov survey 2020, Pakistan is ranked 153rd among UN member states (UN 2020c), which is well below global and regional rankings-see Table 2.3. These results are corroborated by the Network Readiness Index by the World Economic Forum (WEF) that ranks countries based on their ability to utilise opportunities created by ICT. Pakistan is ranked 110 on that index.

Table 2.3: UN e-Gov survey rankings

Country	2020	2018	2016
Denmark	1	1	9
Australia	5	2	2
UAE	21	21	29
Saudi Arabia	43	52	44
Sri Lanka	85	94	79
India	100	96	107
Bangladesh	119	115	124
Pakistan	153	148	159

On the other hand, the International Telecommunication Union (ITU) regulatory tracker benchmarks a country's ICT regulatory framework (ITU 2018a). It categorises four generations of ICT regulators; first generation or G1 are highly regulated public monopolies under strict government control; second generation (G2) are countries with partial liberalisation across some spheres; G3 foster access, innovation, and investment with a focus on encouraging investment and consumer protection. The highest and most favourable regulatory environment, G4 is an integrated regulatory environment steered by economic and social goals (ITU 2018b). According to the ITU ICT Regulatory tracker, Pakistan is placed amongst the highest or in the G4 category and is ranked 35th out of 190 countries. It is the only fourth generation regulator among South Asian nations (ITU 2018b; PTA 2018). Based on this, it can be argued that the telecom regulatory regime in Pakistan is liberal and conducive for growth of telecom and broadband services.

Yet, notwithstanding the assessed conducive environment for growth of telecom and broadband services, there is a second paradox specific to Pakistan's circumstances. This paradox concerns the fact that despite two decades of policy efforts by the government and having a liberal telecommunications and ICT regime, the country still ranks low in terms of global e-Gov development.

2.3.2 E-Gov Research in Pakistan

Emerging economies lag in technology adoption especially in the public sector (Alateyah, Crowder & Wills 2012; Carter & Bélanger 2005; Reddick 2005). Although technological advancements and especially wireless communications services have improved access to ICT services, e-Gov initiatives in developing economies face a lot of barriers and are still in their infancy (Ahmad, Markkula & Oivo 2012). Table 2.4 lists findings of a few e-Gov studies in the context of Pakistan.

Table 2.4: Studies on e-Gov in the context of Pakistan

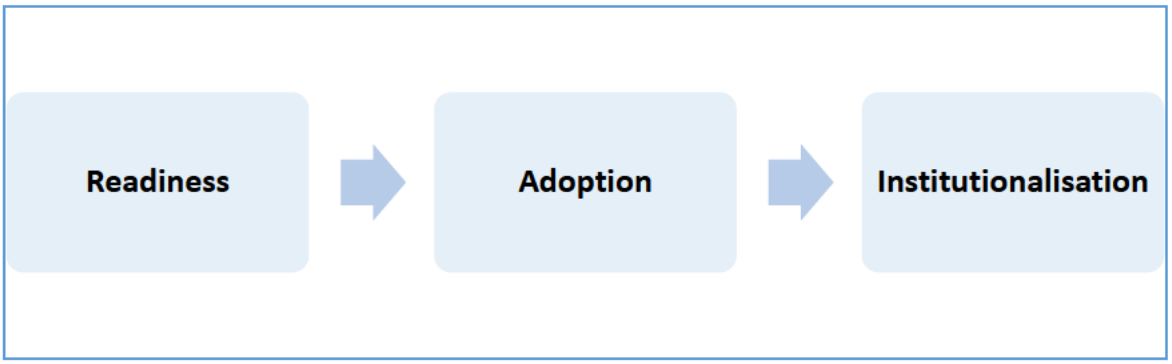
Study	Focus	Method /Model	Finding
(Qaisar & Khan 2010)	Organisational (G2G)	Longitudinal case study. No specific theory mentioned	Implementation of e-Gov is a daunting task in Pakistan especially in the absence of IT infrastructure and financial resources.
(Ahmad, Markkula & Oivo 2012)	Citizens (G2C)	Quantitative/ UTAUT (modified)	Perceived usefulness, ease of use, lack of awareness and trust influence adoption.
(Haider et al. 2015)	Organisational G2G	Quantitative/ UTAUT (modified)	UTAUT model supported.
(Kazi & Mannan 2013)	Citizens (G2C)	Quantitative/ TAM	Customers use intention is influenced by perceived usefulness, perceived ease of use, perceived risk and social influence.
(Rehman, Kamal & Esichaikul 2016)	Citizens (G2C)	Quantitative/ TAM/DOI	Website design, e-readiness, security, trust and quality of services influence intention to adopt e-Gov services.
(Zahid & Haji Din 2019)	Citizens (G2C)	Quantitative/Theory of Planned Behaviour	Trust, attitude, subjective norms and perceived behavioural control influence adoption

2.4 Technology Adoption

Technology uptake or adoption is a widely researched subject at both individual and organisation levels (Venkatesh 2006). This uptake process also has a perspective on change (Smuts, Lalitha & Khan 2017; Straub, ET 2009) and the change process is synonymous with feelings of discomfort and unease (Bernerth 2004). Yet as many others scholars observe, change is an indispensable element of organisational survival and competitiveness in today's world (Benn, Edwards & Williams 2014; Burnes 2015). In recent times, ICT has become the principal source of change in the public sector, driving both efficiency and transparency in government processes (Flak, Eikebrokk & Dertz 2008; Pandey & Gupta 2017; Watson & Mundy 2001). In fact, as Armenakis and Bedeian (1999) suggest, adoption

is a second step in a three-step change process preceded by readiness and succeeded by institutionalisation. The three-step process is depicted in Figure 2.4 below. According to Armenakis and Bedeian (1999), readiness is a cognitive state comprising beliefs, attitudes and intentions toward a change effort, and can be described at both individual and organisational levels. Resistance on the other hand is an obstacle in an organisation's structure that prevents change (Kotter 1996). It is displayed by people's behaviour, such as being critical, withholding information and procrastinating (Petrini & Hultman 1995).

Figure 2.4: Three-step change process (Armenakis and Bedeian (1999)



In navigating this change paradox, efforts to build readiness can reduce resistance and so the issues in this pre-adoption step are essentially two sides of the same coin (Stagl 2017). In the view of Armstrong et al. (2014), readiness is built in multiple stages. The first stage is awareness about a new product or a service. In the second stage a user develops an interest in the product or service and collects further information about it like price, features, functions, etc. After having obtained the requisite information, a potential user evaluates the innovation in the third stage. In the fourth and final stage, a user conducts a small-scale trial of the innovation and if the trial is satisfactory, will adopt the innovation.

2.4.1 E-Government Adoption

In e-Gov literature, both intentions to use and actual use have been used to predict adoption (Alharbi & Sohaib 2021; Bélanger & Carter 2008; Carter et al. 2016; Rana, Dwivedi & Williams 2013; Shareef et al. 2011; Zhao & Khan 2013). According to some studies (Carter & Bélanger 2005; Tao 2009; Warkentin et al. 2002), it is the intention of citizens to use e-Gov services, while others consider adoption as actual use of the system (Gefen et al. 2002). Extending this discussion further, another perspective is given by Kumar, V et al. (2007) who assert that adoption is a multidimensional concept which can be described in stages. The first stage is a decision to use or not to use an e-Gov service. The second stage is how frequently it is used, and the third stage is scope or purpose of the usage, i.e. if the service

is just being used to acquire some information or for interacting or transacting with the government. In this study actual use is taken as measure for adoption, as also construed in the original IS success model (Petter, DeLone & McLean 2008), and also because among these different measures, actual use is considered as the most objective and easiest to quantify (DeLone & McLean 1992).

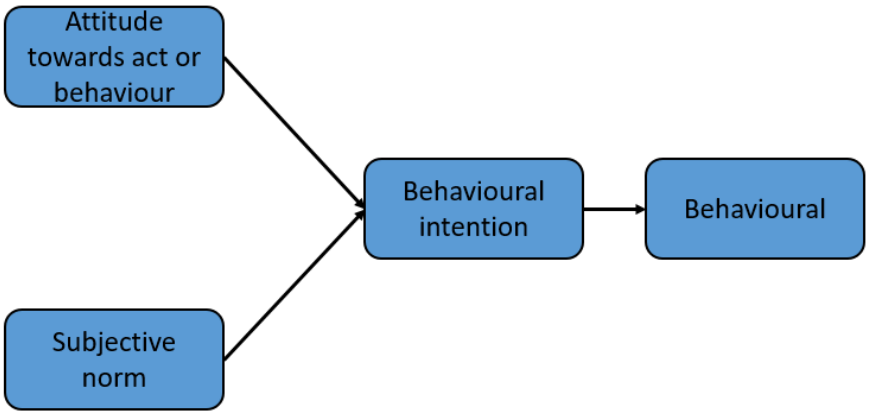
2.5 Adoption Theories

Technology adoption is a complex developmental process during which individuals develop distinct perceptions of technology - see Straub, ET (2009). These perceptions reportedly shape the adoption process, and successful adoption requires addressing related cognitive and contextual concerns (Straub, ET 2009) at the individual and organisational level (Gangwar, Date & Raoot 2014; Oliveira & Martins 2011; Shafique et al. 2017). Several theories have been devised to explain technology adoption. For example the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) originally developed for psychological research have gained seminal importance for investigating technology adoption (Taherdoost 2018). Many subsequent models like the Technology Acceptance Model (TAM) by Davis (1989) have their foundations in TRA. An overview of both theories is provided in the next section before discussing more contemporary models.

2.5.1 Theory of Reasoned Action

Theory of Reasoned Action (TRA) is one of the fundamental theories used to predict human behaviour. TRA has its roots in social psychology and was proposed by Ajzen (1985). The theory has been widely employed to predict different kinds of behaviour ranging from smoking addiction (Taylor et al. 2006) to information technology adoption (Mishra, Akman & Mishra 2014). According to this theory behavioural intention predicts actual behaviour while behavioural intention is influenced by attitude and subjective norm. Attitude is a person's positive or negative feeling about actual behaviour, while subjective norms comprise the perceptions of the people around him or her to perform or not perform that particular behaviour (Fishbein & Ajzen 1977). Figure 2.5 depicts the relationship between different constructs of this theory.

Figure 2.5: Theory of Reasoned Action (Fishbein & Ajzen 1977)



The theory is added here for completeness. However, this study does not use the TRA to guide this research process because the theory does not consider specific factors influencing behavioural intention that are of particular importance to e-Gov adoption, such as information, system and service quality.

2.5.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) proposes that behaviour is determined by attitudes, subjective norms and perceived behaviour control (Ajzen 1991). While attitude and subjective norms are adopted from TRA, perceived behavioural control indicates the ease of undertaking a particular behaviour. TPB has been used in various contexts to predict users' behaviours and intentions. For example, it has served to predict adoption of information systems (Mathieson 1991), e-commerce and online shopping (Yen, C & Chang 2015). The theory is not used in this study as its main features are encompassed in the TRA.

2.6 Adoption Theories (Technology Characteristics)

2.6.1 Diffusion of Innovation (DOI) Theory

The Diffusion of Innovations (DOI) by Rogers (2010) is a popular theory in the field of information systems (Gupta, Singh & Bhaskar 2016; Ifinedo 2011; Shah Alam 2009). According to Rogers (2010) an individual's intention to adopt an innovation is shaped by five distinct factors, namely: i) relative advantage; ii) compatibility; iii) complexity; iv) trialability; and 5) observability. Relative advantage is the degree to which an innovation is seen as superior to its predecessors. Compatibility is the extent to which an innovation is perceived as compatible with existing values and requirements of adopters, whereas complexity is the potential difficulty to use an innovation as seen by the adopter. Finally,

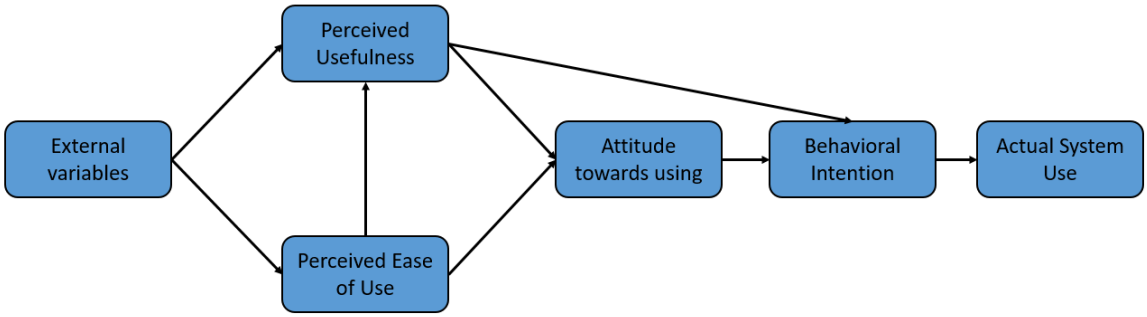
trialability is the degree to which an idea can be experimented with on a small scale, whereas observability is the visibility of results of an innovation (Gupta, Singh & Bhaskar 2016).

DOI has been widely used in technology adoption contexts (Korpelainen 2011) and is one of the most frequently used theories in G2C adoption (Rana, Dwivedi & Williams 2013). Many studies have used DOI to study e-Gov adoption (Amagoh 2016; Carter & Bélanger 2005; Lawson-Body et al. 2014; Singh, M et al. 2008), however they primarily focused on three DOI constructs, these being complexity, relative advantage and compatibility (Agarwal & Prasad 1998; Rana, Dwivedi & Williams 2013). The limitations noted with this approach are: firstly, it does not offer adequate constructs for collective adoption behaviour; and secondly, does not take into account the effect of regulations and institutional policies that are of particular importance in G2C adoption (Lyytinen & Damsgaard 2001).

2.6.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model was proposed by Davis (1989), and it is recognised as the traditional adoption theory in the field of IT (Awa et al. 2011; Awa, Ojiabo & Emecheta 2015; Horst, Kuttschreuter & Gutteling 2007). TAM explains how users accept and use new technology, with the model's theoretical foundations based on the theory of reasoned action (TRA) which was devised by Fishbein and Ajzen (1977). According to Davis (1989), perceived usefulness (PU) and perceived ease of use (PEOU) are two primary determinants of an individual's intention to adopt a system (Fu, Farn & Chao 2006). Perceived usefulness (PU) is the degree to which a person believes that using a system will enhance his performance, and perceived ease of use (PEOU) is the degree to which a person believes that using a particular technology will be free of effort. These two variables impact a user's attitude to using new technology, the attitude influences his behavioural intention, which determines the actual system usage (Gupta, Singh & Bhaskar 2016) - see Figure 2.6. Both, perceived usefulness and perceived ease of use exert a significant influence on e-Gov adoption in extant literature (Carter & Bélanger 2005; Horst, Kuttschreuter & Gutteling 2007).

Figure 2.6: Technology Acceptance Model (TAM) (Davis 1989)



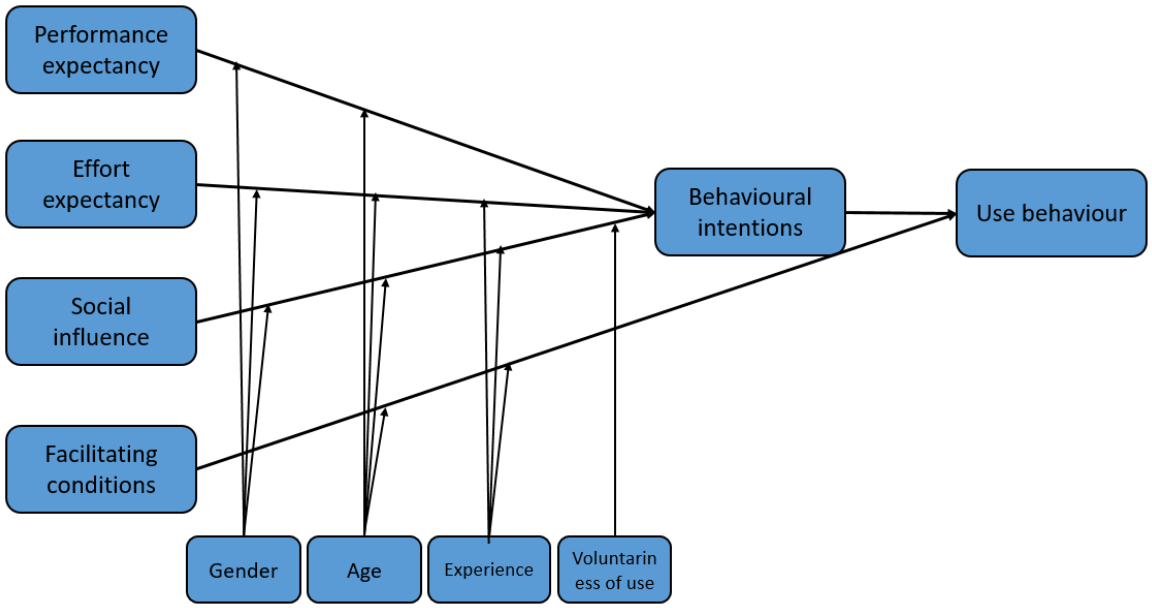
The TAM has been extensively used in adoption research, empirically validated, and tested in different adoption contexts such as e-commerce (Fayad & Paper 2015; Moon, J-W & Kim 2001), e-Gov (Fu, Farn & Chao 2006; Sebetci 2015) and mobile government (Alotaibi, Houghton & Sandhu 2017; Osman 2013). Another advantage of TAM is that it has reliable instruments which are empirically validated (Pavlou 2003). However, one of the limitations of TAM is that it provides only limited information on users' tendencies to adopt a specific system in terms of perceived usefulness and ease of use. This limits its explanatory and predictive power (Awa, Ojiabo & Emecheta 2015). The model would have been more useful if it identified the antecedents of perceived usefulness and perceived ease of use, rather than only measuring the perceptions of use (Horst, Kuttschreuter & Gutteling 2007; Patel & Jacobson 2008). This limitation is echoed by many other scholars that TAM fails to elaborate how these two technology beliefs - PU and PEOU - can be formed or shaped to manage the user behaviour (Jensen & Aanestad 2007; Yousafzai, Foxall & Pallister 2007). This limitation is addressed by the Technology Readiness Acceptance Model (TRAM) which offers personality traits as predictors of TAM's technology beliefs of perceived usefulness and perceived ease of use which will be discussed in subsequent sections (Lin, C, Shih & Sher 2007).

2.6.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

Technology adoption research has yielded different theories and models that explain adoption with different antecedent variables. UTAUT assimilated the strengths of eight different theories, including the theory of reasoned action (TRA), theory of planned behaviour (TPB), technology acceptance model (TAM), diffusion of innovation (DOI) theory, motivational model (MM), social cognitive theory (SCT) and model of PC utilisation (MPCU) to devise a unified model of technology acceptance (Venkatesh et al.

2003). According to the model as depicted in Figure 2.7, behavioural intention is predicted by effort and performance expectancy, social influence and facilitating conditions (Gupta, Singh & Bhaskar 2016). Performance expectancy is the degree to which an individual believes that use of a system will improve his or her job performance, whereas effort expectancy is the degree of ease associated with deployment of the system (Barua 2012). The model has four moderating variables: age, gender, experience and voluntariness of use.

Figure 2.7: Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)



The model's validity has been established in different adoption contexts (AlAwadhi & Morris 2008; Zhou, Lu & Wang 2010), such as e-Gov (AlAwadhi & Morris 2008) and the banking sector (Zhou, Lu & Wang 2010). However, one of its limitations is that it is less parsimonious and has complex interactions among different variables (Venkatesh, Thong & Xu 2016).

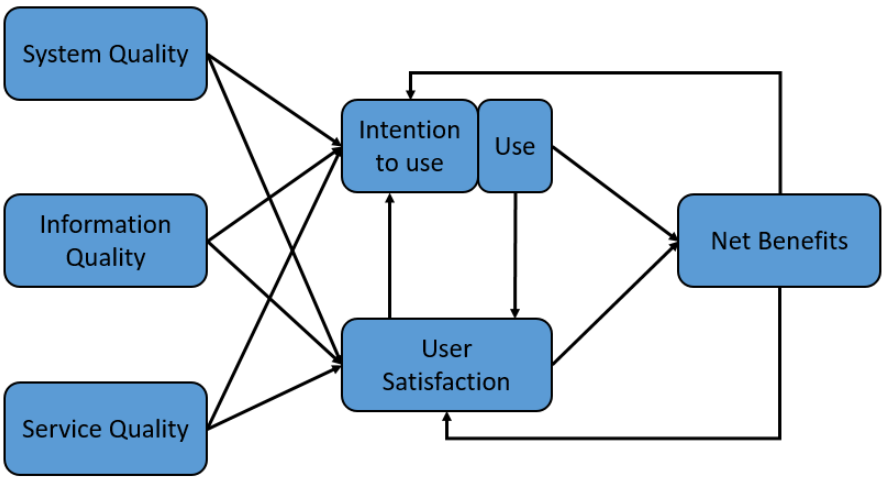
In a later review, Venkatesh, Thong and Xu (2016) synthesised the ten-year literature on UTAUT and proposed a multilevel UTAUT framework. The updated framework added individual contextual factors such as user attributes, technology attributes and task attributes, along with higher level contextual factors such as environment attributes, organization attributes and location attributes to the baseline UTAUT model. The multilevel framework not only integrated the existing UTUAT extensions but also proposed future research directions on technology acceptance and use.

2.6.4 Information System (IS) Success Model

DeLone and McLean (1992) proposed a model of IS success arguing that a well-defined outcome measure is essential to contribute to practice. The model comprised of six constructs, namely *system quality, information quality, use, user satisfaction, individual impact* and *organizational impact*. The basic premise of this model is that system quality and information quality do impact on system use and user satisfaction and proposed there is an interdependence between usage and user satisfaction (Iivari 2005). System quality is the technical measure of success such as useability and reliability of the system. Information quality is related with the system's output of information being relevant, concise, and accurate. IS success model is a causal-explanatory model explaining the reciprocal relationship between use and user satisfaction which influences individual impact and ultimately translates to organisational impact (DeLone & McLean 1992).

The initial model was updated in 2003 by incorporating a new measure of service quality and net benefits instead of individual and organisational impact (Petter, DeLone & McLean 2008). Service quality is the quality of support available to the users of an IS system. System use refers to the level of use or adoption of an information system (DeLone & McLean 1992). The updated IS success model replaced individual impact and organisational impact with a broader concept of net benefits since it was realised that having a construct of individual or organisational impact limits the model. In actuality, IS has the potential to create far-reaching impacts beyond just individual users, such as industry and the wider society (Delone & McLean 2003). Therefore, instead of complicating the model by adding more categories of impacts, these were all grouped into a single category of net benefits. Figure 2.8 depicts the relationships between these constructs.

Figure 2.8: The updated Delone and McLean (2003) IS Success model



This updated IS success model has been widely used, both in its original form and in parts and results affirm the validity of the model (Michel & Cocula 2017; Petter, DeLone & McLean 2008; Urbach, Smolnik & Riempp 2008). The IS success model has also been widely used in e-Gov contexts (Floropoulos et al. 2010; Rana, Dwivedi, Williams & Weerakkody 2015; Sambasivan, Wemyss & Rose 2010; Sterrenberg 2016). The model is most suitable for this study not only because it is empirically validated (Rai, Lang & Welker 2002), but it has also been used in e-Gov adoption contexts and most importantly provides a measure of impact assessment through the construct of net benefits (Scott, M, DeLone & Golden 2016). Therefore, the IS success model addresses both research questions of the study, i.e., to examine adoption and evaluate impact in terms of the PV approach. Accordingly, the conceptual underpinnings of the study are based on IS success model.

2.7 Adoption Theories (Individual Characteristics)

Why is one individual able to adopt a new technology and yet another finds the encounter stressful? Are there specific characteristics that influence an individual's decision to adopt an innovation? Such questions have evoked a lot of research interest in technology adoption (Ren 2019). A study by Straub, ET (2009) partially answered these questions suggesting that technology uptake is a complex cognitive process in individuals based on unique perceptions of technology that influence their decision to adopt or reject that technology. This is further illustrated by Parasuraman and Colby (2015) who argue this developmental and cognitive process is shaped by mental inhibitors and motivators that that as a whole determine attitudes towards using a new technology.

Both Straub (2009) and Parasuraman and Colby (2015) answer the questions raised at the beginning of this section and illustrate the significance of individual dispositions when predicting adoption (Parasuraman 2000). Arguably, many e-Gov projects fail because these individual characteristics are not factored into the design and implementation phase of such a project (Mensah, Zeng & Luo 2020). In view of this potential moderation, adoption models focusing on individual characteristics are gaining attention. Two of the most commonly occurring models – the TRI and the TRAM – are discussed below and they focus on individual needs.

2.7.1 Technology Readiness Index

The Technology Reediness Index (TRI) uses individual predispositions to predict a person's readiness to use new technology (Walczuch, Lemmink & Streukens 2007). The index

measures a user's tendency to accept and use new technologies to fulfil personal and work-related goals and offers a way to categorise individuals based on their positive or negative technology beliefs (Parasuraman 2000). The index has four constructs: i) Optimism is a positive view of technology, people having this view believe that new technology offers increased control, flexibility and efficiency; ii) Innovativeness is pioneering and leading the way in use of new technology; iii) Discomfort reveals a user's inability to control the technology, while iv) Insecurity shows lack of trust and doubts on capability of new technology to be effective. Innovativeness and optimism are motivators of technology acceptance, while insecurity and discomfort are described as inhibitors (Aboelmaged 2014; Parasuraman 2000).

Research shows a very strong influence of technology readiness on consumer attitudes and adoption of new technologies (Walczuch, Lemmink & Streukens 2007; Wang, Y, So & Sparks 2017). Related studies on e-commerce suggest that some level of technology readiness among users is critical, especially in the context of online platforms (Lu, Wang & Hayes 2012; Parasuraman 2000). As e-Gov systems are innately online-based, investigating the role of technology readiness on user satisfaction and adoption is clearly very important.

2.7.2 Technology Readiness and Acceptance Model

The Technology Readiness and Acceptance (TRAM) model integrates the Technology Readiness Index (TRI) and the Technology Acceptance Model (TAM) by Lin, C et al. (2007). In the original attempt to integrate these two models, technology readiness is used as a predictor of TAM, however in later studies TRI determinants were linked directly to perceived usefulness and perceived ease of use (Godoe & Johansen 2012; Walczuch, Lemmink & Streukens 2007). Previous studies show well-recognised associations between perceived usefulness, perceived ease of use and actual usage (Davis 1989; Schepers & Wetzels 2007; Venkatesh & Davis 2000). Table 2.5 summarises key constructs of technology acceptance models discussed above.

Table 2.5: Key constructs of technology acceptance theories

Theory / Model	Construct	Description	Source
Theory of Reasoned Action (TRA)	Attitude	An individual's positive or negative feeling about a behaviour	(Fishbein & Ajzen 1977)
	Subjective Norm	Perceptions of the people around a person to perform or not perform a particular behaviour	

Theory of Planned Behaviour (TPB)	Perceived Behavioural Control (PBC) as an additional construct along with attitude and subjective norm	Perceived behavioural control is a person's belief to undertake a particular behaviour (self-efficacy).	(Ajzen 1985)
Diffusion of Innovation Theory	Relative Advantage	Degree to which an innovation is better than its predecessor.	(Rogers 2010)
	Compatibility	Extent to which an innovation is perceived as compatible with existing values and requirements of adopters	
	Complexity	Degree to which a system is considered as difficult to use.	
	Observability	Visibility of results of an innovation	
	Trialability	Degree to which an idea can be experimented on a small scale	
Technology Acceptance Model (TAM)	Perceived Usefulness	Perception that using a particular system will increase performance.	(Davis 1989)
	Perceived Ease of Use	Degree to which using a particular system is free of effort.	
Unified Theory of Acceptance and Use of Technology (UTAUT)	Performance Expectancy	Degree to which an individual believes that use of system will increase his or her job performance	(Venkatesh et al. 2003)
	Effort Expectancy	Degree of ease associated with the use of the system	
	Social Influence	Degree to which a person believes that important people around him or her believe that he or she should use a system	
	Facilitating Conditions	Degree to which a person believe that necessary infrastructure exists to support use of the system	
IS Success Model	Information Quality	Information quality is related with the system's output of information being relevant, concise, and accurate	(Delone & McLean 2003)

	System Quality	System quality is the technical measure of system such as useability and reliability.	
	Service Quality	Service quality is the quality of support available to the users of an IS system.	
Technology Reediness Index (TRI)	Optimism	Positive view of technology, people having this view believe that new technology offers increased control, flexibility and efficiency.	(Parasuraman & Colby 2015)
	Innovativeness	Pioneering and leading the way in use of new technology.	
	Discomfort	Shows a user's inability to control the technology.	
	Insecurity	Shows lack of trust and doubts on capability of new technology to be effective.	

2.7.3 Recent Studies on G2C Adoption of e-Gov services

Several studies have examined e-Gov adoption utilising the above-mentioned theories in their original or modified versions, to empirically validate these theories in their contexts. Table 2.6 tabulates recent studies on citizens' adoption of e-Gov services, detailing the context and summary of the findings.

Table 2.6: Studies on G2C adoption of e-Gov services

Study	Theory	Context	Variables	Findings
(Mensah 2019)	UTAUT	China	Facilitating conditions, perceived service quality, social influence, performance expectancy, effort expectancy and trust	Facilitating conditions, perceived service quality, trust in the government, and social influence were significant predictors of e-Gov adoption. Performance expectancy, effort expectancy, and trust in the Internet were insignificant for predicting e-Gov adoption.
(Naranjo-Zolotov, Oliveira &	UTAUT	Portugal	Facilitating conditions, social influence, performance expectancy, effort	Performance expectancy and facilitating conditions were the strongest predictors of intention to use

Casteleyn 2019)			expectancy, psychological empowerment	Effort expectancy and social influence had no significant effect on the prediction of intention to use e-participation.
(Zhao & Khan 2013)	TAM	UAE	Perceived ease of use, perceived usefulness, trust, computer self-efficacy	Behavioural intention to use e-Gov is influenced by cultural contexts.
(Carter et al. 2016)	DOI	US and UK	Perceived usefulness, perceived ease of use, trust.	Perceived usefulness, perceived ease of use and internet trust positively influence intention to use e-Gov services.
(Al Mansoori, Sarabdeen & Tchantchane 2018)	UTAUT	UAE	Performance expectancy, effort expectancy, social influence, facilitating conditions, trust on government, trust on internet	Trust and performance expectancy are strongest predictor of e-Gov use. Effect of social influence on e-Gov use was found to be insignificant.
(Susanto & Aljoza 2015)	UTAUT, TAM	Indonesia	Perceived usefulness, perceived ease of use, social norms, trust and facilitating conditions.	Trust and social influence are the most significant predictor of use of e-Gov services.
(Sepasgozar et al. 2020)	TAM	Iran	PU, PEOU	PU and PEOU do influence e-Gov adoption.
(Weerakkody et al. 2016)	IS Success Model	UK	Information quality, system quality, trust, and cost	Information quality, system quality, trust, and cost significantly influence user satisfaction.
(Veeramootoo, Nunkoo & Dwivedi 2018)	IS Success Model	Mauritius	Info quality, System quality, Service quality, habit, perceived risk	System quality, user satisfaction and habit strongly influence use intention of e-Gov services
(Rodriguez-Hevía, Navío-Marco & Ruiz-Gómez 2020)	Not specified	EU	Secondary data.	Digital skills are the most important factor for predicting e-Gov adoption.

(Benavides et al. 2021)	Risk communication	US	Secondary data.	Multilingual emergency management websites are important for e-Gov uptake.

2.8 Digital Divide

The term digital divide, coined by (Norris, P 2001) identifies a gap between technology haves and have-nots and is argued as a significant barrier to e-Gov uptake (Harvey, Hastings & Chowdhury 2021). This concept has evolved into a more complex idea that has even added skills and psychological access - where a user has little interest or even negative attitude towards computers, as well as lack of access to infrastructure and digital literacy skills as comprising a digital divide (Antonio & Tuffley 2014).

A digital divide can also be created by socio-economic differences, such as gender, income, education, degree of access to technology or a working internet, geographical locations or extent of ICT skills among different segments of the population (Okunola, Rowley & Johnson 2017). This divide is even more prominent in emerging countries (Singh, S 2017) and is evident in Pakistan due to inequalities in internet access, skills and socio-economic dynamics of the population (Jamil 2021). It is argued that G2C e-Gov initiatives cannot be successful until governments addresses this issue of digital divide (UN 2020b).

2.9 Synthesis - Need for Integrated Techno-Individual Model

The varying theoretical approaches taken by scholars to explain adoption in a wide-ranging set of contexts are summarised in Table 2.6. A common approach has been to use behavioural models that employ technology characteristics like perceived usefulness, effort expectancy or the relative advantage a technology offers over its predecessors to predict adoption (Westjohn et al. 2009). However, the individual – who is an actual pivot against whom the adoption process revolves – has largely been ignored. It is equally important to investigate the interaction between technology characteristics and the individual (Parasuraman & Colby 2015). So far there have been only a few attempts to jointly study individual and technology characteristics (Lin, C, Shih & Sher 2007; Meuter et al. 2005). The construct of technology readiness is an attitudinal variable that caters for individual differences (Westjohn et al. 2009), as it helps to explain why a technology is accepted by some but rejected by others (Ren 2019).

Another issue to be considered is that not all citizens may be equally ready to embrace new technology (Rojas-Méndez, Parasuraman & Papadopoulos 2017). This consideration signifies technological readiness as being the cornerstone of the adoption process. Unsurprisingly, some segments of the population tend to avoid using technology due to technophobia - an anxiety about of using a new technology or any sort of sophisticated device (Kotze, Anderson & Summerfield 2016). These issues signify a need for a model that has both technology variables and also caters for individual differences (Rana et al. 2017). Overall, a multi-theoretical view is useful as such a perspective enables a comprehensive understanding of the issue (Taherdoost 2018). Moreover, by taking this approach any weakness of one model is arguably compensated by the strength of another and yields deepening insights (Prediger, Bikner-Ahsbahs & Arzarello 2008). Noting these limitations in the scant literature and recommendations for a way forward, this study takes an integrated multilevel view and uses the IS success model in combination with the TRI to examine adoption.

2.10 Assessing E-Gov Effectiveness

Turning our attention from adoption per se to assessing e-Gov uptake, there is little apparent agreement on how to assess the development of online e-Gov services (Zahran et al. 2015). However, two common approaches found in the literature use either e-Gov maturity levels (Peters, Janssen & Van Engers 2004) or a public value approach (Twizeyimana & Andersson 2019b). Both approaches are discussed below.

2.10.1 Using Service Maturity Levels

Maturity levels are a set of incremental development stages which can be used to assess or rank performance of e-Gov services (Fath-Allah et al. 2014; Zahran et al. 2015). Having such assessment modelling is important as countries are allocating substantial resources for e-Gov initiatives, and maturity models provide an established approach to examine the current status of the e-Gov services (Khanra & Joseph 2019). The extant literature suggests that various maturity models have been developed by both practitioners and academics (Andersen & Henriksen 2006; Di Maio 2000; Layne & Lee 2001) having progressive stages from basic to advanced level of e-Gov development. Scholars have conducted systematic reviews and meta-analysis of maturity levels (Fath-Allah et al. 2014; Khanra & Joseph 2019). A common theme emerging from these reviews is that the initial stage of all models is signified by online presence, whereas the most developed stage, a fully integrated stage, facilitates participatory and democratic processes (Khanra & Joseph 2019; Wescott 2001).

Table 2.7 provides a comparison of different stage of commonly used e-Gov maturity models.

Table 2.7: Comparison of e-Gov maturity models

Stages	(Layne & Lee 2001)	(Hiller & Bélanger 2001)	(Moon, MJ 2002)	(Siau & Long 2005)	(Wescott 2001)
One	Catalogue	Information	Information dissemination	Web presence	Set up an email system and internal network
Two	Transaction	Two-way communication	Two-way communication	Interaction	Establishing inter-organisation and public access to information
Three	Vertical integration	Transaction	Service and financial transaction	Transaction	Two-way communication
Four	Horizontal integration	Integration	Integration	Transformation	Exchange of values
Five	-	Participation	Political participation	e-Democracy	Digital democracy
Six	-	-	-	-	Joined-up government

2.10.2 Weakness of a Service Maturity Levels approach

Although maturity models are a good way to categorise the development stage of e-Gov system, there are several issues observed in assessing e-Gov with a focus on maturity levels (Joshi, PR & Islam 2018). First, different maturity models tend to concentrate on different functionalities. As Fath-Allah et al. (2014) concluded, based on a detailed literature review of twenty-five maturity models, most models looked at different features of e-Gov. For example, in some models the highest maturity stage is enabled integrated transactional capabilities in an e-Gov system (Di Maio 2000; Layne & Lee 2001), while in other models the highest development stage was one that facilitated participatory democratic processes (Hiller & Bélanger 2001; Moon, MJ 2002; Siau & Long 2005). Due to these inconsistencies the collective inferred need is for a more comprehensive maturity model incorporating all best practices (Fath-Allah et al. 2014).

Second, a common issue observed in maturity models is that they are developed with a focus on the government or the supply side perspective, while ignoring the citizen and individual adoption considerations (Zahran et al. 2015). One of the limitations of this bias is that it compromises citizen issues which in turn impedes intended e-Gov outcomes (Kunstelj, Jukić & Vintar 2007). Third, these models are descriptive and aspirational, and lack sound theoretical reasoning. For example, enabling e-democracy may be a desirable goal of e-Gov,

however in maturity models there is no logical reasoning to support how e-Democracy is in fact the highest development stage (Debri & Bannister 2015). Therefore, maturity models appear to have limitations that are unhelpful when assessing e-Gov uptake and effectiveness.

2.10.3 Using Public Value (PV) to assess e-Gov Impact

A second approach to assessing e-Gov uptake and impact is via the concept of public value, which first emerged from a seminal study conducted by Moore (1995). This concept was proposed to replace earlier management practices often criticised for their emphasis on cost efficiencies (Cordella & Bonina 2012). Public value is the value or significance recognised by citizens for their experience of public service and government policies (Moore 1995). It defines a new way of evaluating government services in terms of efficiency, effectiveness and social values (Bryson, Crosby & Bloomberg 2014; Stoker 2006). This capability is described as an important shift in focus from service production to service delivery when meeting citizens' expectations (Panagiotopoulos, Klievink & Cordella 2019).

PV theory offers a theoretical basis to examine public value created by e-Gov initiatives (Panagiotopoulos, Klievink & Cordella 2019). These initiatives are established on premise of transforming public services by creating value for citizens (Bannister & Connolly 2014; Panagiotopoulos, Klievink & Cordella 2019). This idea is supported by Harrison et al. (2012), who argue that PV can be used as a means of meeting citizen expectations and it should be the goal of all public institutions. Similarly, e-Gov seeks to create values like administrative efficiency, transparency and social values, as summarised in Table 2.8. Therefore, both e-Gov and PV aim to achieve similar objectives and this means creating efficiencies in public processes and enhancing trust in government (Bryson, Crosby & Bloomberg 2014; Twizeyimana & Andersson 2019b).

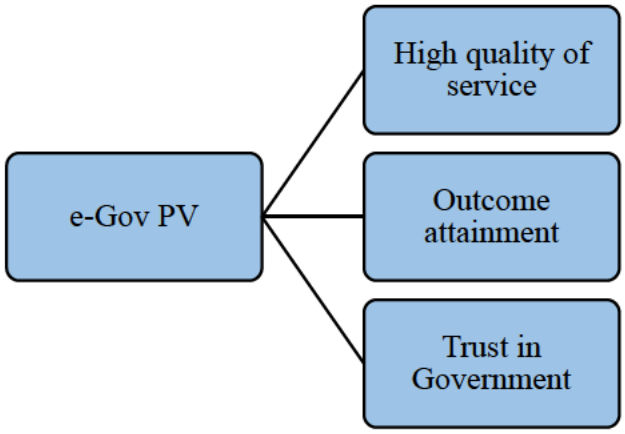
Table 2.8: E-Gov values identified in the literature

e-Gov values	Source
Efficiency, effectiveness	(Cook & Harrison 2015; Khan 2018; Rose, Persson & Heeager 2015; Scott, M, DeLone & Golden 2016)
Trust, confidence	(Castelnovo 2013; Rose, Persson & Heeager 2015; Scott, M, DeLone & Golden 2016)
Social values, citizen participation and empowerment	(Castelnovo 2013; Cook & Harrison 2015; Scott, M, DeLone & Golden 2016)

Transparency	(Dawes & Helbig 2010; Douglas & Meijer 2016)

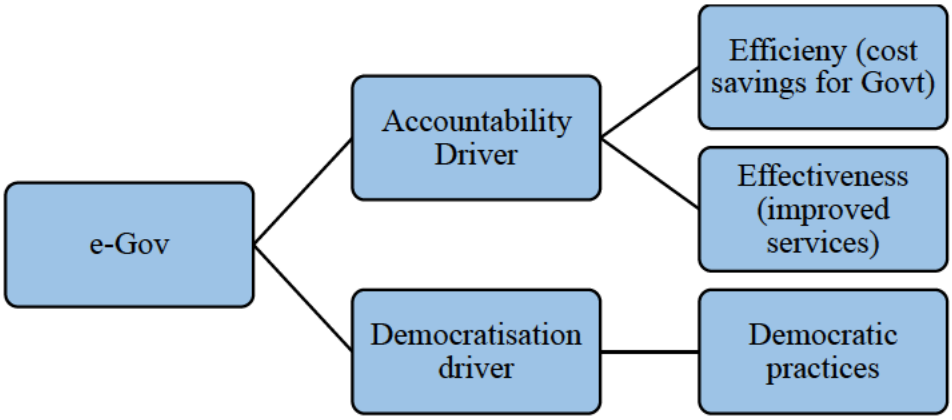
The academic literature on PV has evolved over time. Using e-Gov to achieve PV was first proposed by (Kearns 2004), who suggested that e-Gov can help create PV by assisting government in three broad areas: i) providing high quality services to the citizens; ii) attaining outcomes seen as desirable by citizens like decreased poverty or improvement in health facilities; and iii) establishing trust in government. This is illustrated in Figure 2.9.

Figure 2.9: The PV of e-Gov developed by Kearns (2004)



Another approach is taken by the e-Gov Economies Project (eGEP) in the European Union (EU), which set out to create an e-Gov measurement framework. The framework identified two drivers to evaluate public sector e-Gov initiatives as shown in Figure 2.10. The first is an accountability driver that focused on creating public value by achieving the goals of efficiency – cost savings for the organisation and effectiveness in terms of better services.

Figure 2.10: PV of e-Gov (Codagnone 2007)

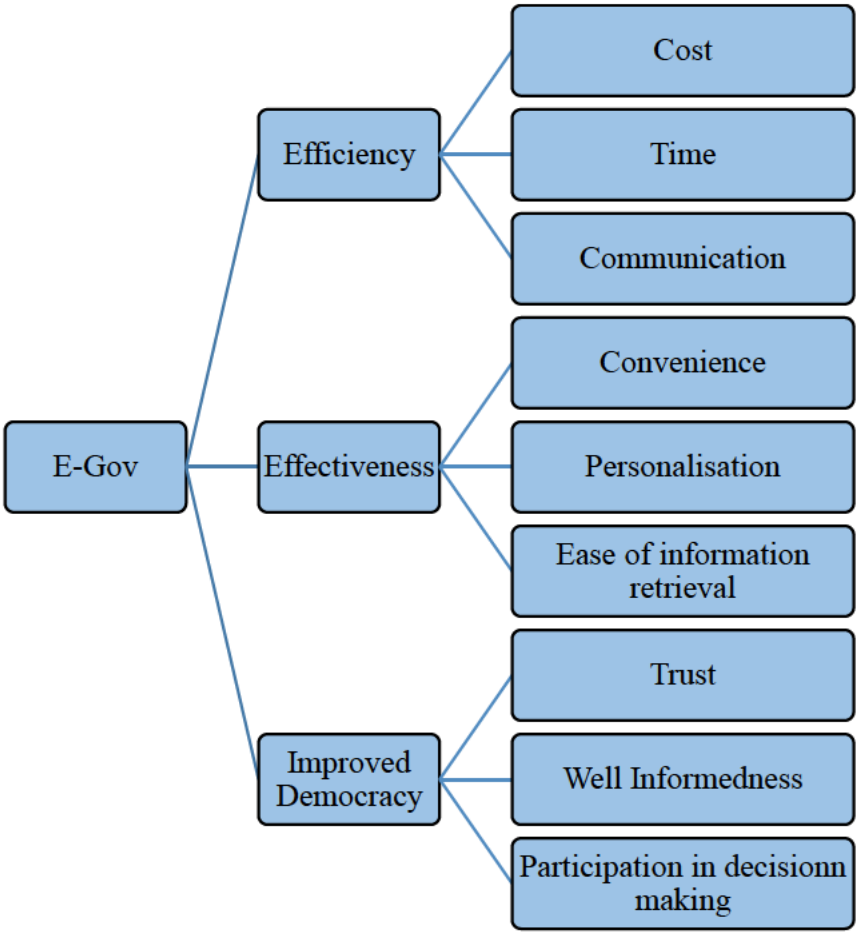


The second is democratisation driver which is concerned with improving democratic practices (Codagnone 2007). That is, beyond providing citizens with information in relation

to government services, e-Gov services can offer the community greater access to political processes and policy choices. Importantly, Lee, Cp, Chang and Berry (2011) note that, a country's level of e-democracy is connected to complex internal processes, such as political norms and citizen pressures.

Following a detailed literature review of recent e-Gov public value literature, Scott, M, DeLone and Golden (2016) identified nine dimensions of e-Gov public value, and grouped them into three categories: efficiency (cost, time and communication); effectiveness (convenience, personalisation and ease of information retrieval) ; and democracy (trust, well informed-ness and participation in decision-making). These nine dimensions of PV are illustrated in Figure 2.11. To validate the PV framework, a 30-item scale representing all dimensions was developed and the proposed model empirically tested using SEM and confirmatory factor analysis. What emerged was a good fit factor model, and construct and discriminant validity were established. These findings establish the validity of the 30 items representing the nine dimensions of public value (Scott, M, DeLone & Golden 2016).

Figure 2.11: Categories of e-Gov PV by Scott, M, DeLone and Golden (2016)



Similar dimensions of PV have been identified by Twizeyimana and Andersson (2019b) who argue there are three broad sources of PV: 1) improved public services; 2) improved administration; and 3) improved social values. They further maintain that e-Gov can be used as a vehicle to create PV since the benefits of IT can be leveraged to improve public service delivery, improve efficiency and effectiveness of government processes which essentially builds trust and confidence in government. That is an intended outcome of PV as well, so effective e-Gov actually complements the creation of PV (Savoldelli, Misuraca & Codagnone 2013).

2.10.4 Rationale for using a PV-based framework to Analyse Impact

As discussed above, common approaches to assess e-Gov initiatives are using maturity models or the public value approach, while some practitioners assess e-Gov initiatives in terms of financial measures, such as measuring cost reduction or calculating payback period of e-Gov projects (Agbabiaka & Ugaddan 2016; Savoldelli, Misuraca & Codagnone 2013). A weakness of the financial measures perspective, however, is that such measures are not appropriate in an e-Gov context, because they do not reflect the broader social returns such as enhanced efficiency and promotion of greater citizen participation that an e-Gov project is intended to achieve (Suri 2017). Similar thoughts are echoed by Kearns (2004), who argued that given the wider benefits of e-Gov, it is not appropriate to focus on cost reduction to analyse performance or impact of e-Gov services.

Similarly, while maturity models offer a viable alternative method of assessment, they also have some inherent limitations as noted above. The primary concerns are being descriptive and lacking a focus on citizens and bottom-up needs (Debri & Bannister 2015; Joshi, PR & Islam 2018). Consequently, a public value-based approach emerges as the most appropriate strategy for assessing e-Gov services, as this view captures the explicit, as well as the wider social and intangible benefits that a simple financial impact assessment fails to measure (Suri 2017; Twizeyimana & Andersson 2019b).

2.11 Research Gap

A review of the literature suggests that e-Gov studies investigating citizen adoption have narrowed their scope to only a few factors (Carter & Bélanger 2005; Carter et al. 2016; Patel & Jacobson 2008; Srivastava & Teo 2009; Weerakkody et al. 2016; Zhao & Khan 2013). Rather, the need is to comprehensively integrate more factors with a proper categorisation for adoption of e-Gov or simply the need is for an integrated model (Jacob et al. 2019; Rana

et al. 2017). Further, existing theories of e-Gov adoption use technology characteristics like perceived usefulness, effort expectancy or the relative advantage of technology to predict adoption (Westjohn et al. 2009). In contrast, measurement of individual differences has largely been ignored. Equally, it is important to investigate the interaction between technology characteristics and the individual (Parasuraman & Colby 2015).

The construct of technology readiness that focuses on attitudinal variable is an approach that attempts to caters for individual differences (Westjohn et al. 2009), when explaining why a technology is accepted by some yet rejected by others (Ren 2019). There have been only a few attempts to study both individual and technology characteristics (Lin, C, Shih & Sher 2007; Mensah, Zeng & Luo 2020; Meuter et al. 2005). This study will attempt to explicitly integrate individuals' personal characteristics with technology characteristics to develop an integrated model for e-Gov adoption.

It is noted that e-Gov as a concept has been around for two decades and over that period governments have reportedly made considerable investments in developing this service. Although various studies have discussed the potential benefits of e-Gov, there is still no convincing evidence on impact (Savoldelli, Codagnone & Misuraca 2012; Savoldelli, Misuraca & Codagnone 2013). According to Scott, M, DeLone and Golden (2016), the impact of e-Gov initiatives can be evaluated in terms of the perceptions of value created from using these systems. Of the many studies assessing e-Gov, only a few have attempted to examine impacts empirically from a citizen perspective, and of those limited studies, examining impact from a PV perspective has largely been ignored (Agbabiaka 2018; Reddick 2005; Scott, M, DeLone & Golden 2016). Consequently, examining e-Gov success via the theoretical lens of the IS success model provides a unique contribution as the IS success model is a process-based model (Delone & McLean 2003) that provides a process conceptualisation of the framework. Conversely, examining benefits through the lens of PV theory gives an outcome-oriented focus to the study.

Only a few studies have examined the impact of e-Gov focusing on public value theory and a particular lack of research is noted in developing countries (Scott, M, DeLone & Golden 2016; Twizeyimana & Andersson 2019a). This study will seek to address this important contextual gap, in the specific context of Pakistan, where the government has been endeavouring to encourage uptake of e-Gov by the people for a considerable time now. Despite these efforts, low adoption rates are still being reported (Arfeen, Iqbal & Mushtaq 2017; Rehman, Kamal & Esichaikul 2016; UN 2020b). Although, some studies have

examined adoption (Ahmad, Markkula & Oivo 2012; Haider, Shah & Chachar 2017; Nizamani 2019) there is minimal literature examining e-Gov with a PV focus on Pakistan and this study seeks to address this gap.

2.12 Summary

To summarise, this chapter presented a broad overview of the concept and classifications of e-Gov. It was further established that the field has conceptual footings in multiple academic disciplines including information systems, public policy and management. Therefore, an integrated e-Gov framework that has conceptual underpinnings in multiple disciplines may help explain e-Gov uptake more promisingly.

To enhance e-Gov uptake, the Government of Pakistan has been making policies and directing financial resources along with the support of international agencies, but nonetheless e-Gov uptake is still considered low. Not surprisingly, Pakistan is still in the bottom quartile among 193 UN member states in terms of UN e-Gov Development Index. This mismatch between investments / policy efforts and outcomes is termed an e-Gov paradox and calls for a novel approach to solve it. It is argued that existing models and theories are inadequate to explain e-Gov adoption and a need for multi-theoretical view is established. Such a perspective will not only provide a more comprehensive understanding of the e-Gov issue, but an added benefit of this approach is that a weakness of one model is arguably compensated by the strength of another.

Subsequently, different approaches to assess e-Gov impacts were discussed, and PV based impact assessment approach was found suitable as this approach captures the wider social and intangible benefits that e-Gov projects endeavour to achieve, however a simple financial impact assessment fails to measure. Building on the above discusses considerations and the gaps identified in the literature, the next chapter will propose and develop and integrated e-Gov framework to examine adoption and PV creation.

CHAPTER 3: CONCEPTUAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

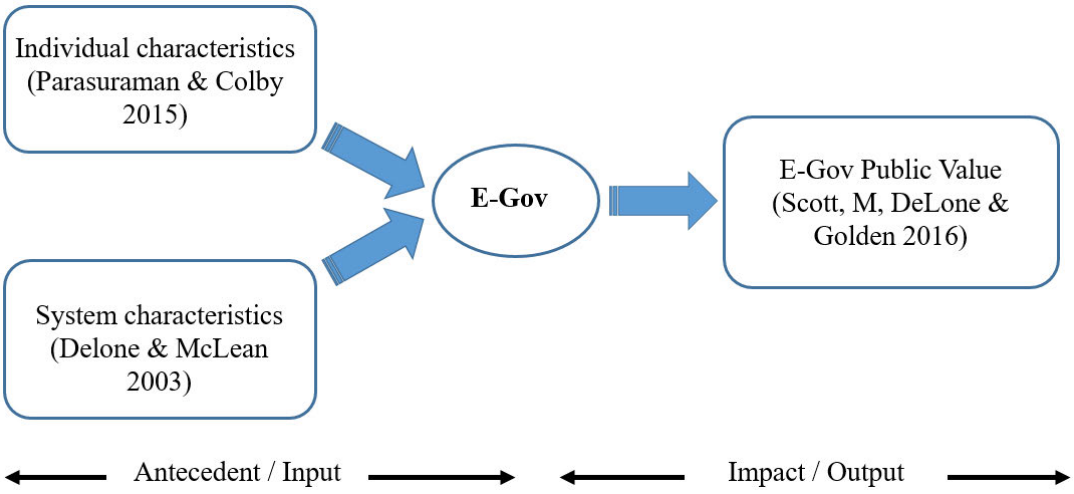
3.1 Introduction

The previous chapter reviewed current e-Gov literature and related theories, and identified several gaps in literature. Building on that discussion, this chapter presents the conceptual model of the study. There are three main components of the conceptual model: individual characteristics, system characteristics and public value of e-Gov. The conceptual model will guide the hypothesis development from the quantitative perspective. From a qualitative point of view, the conceptual model will provide an outline for the thematic discourse based on participants' feedback. The chapter is organised as follows. It first discusses the theories underpinning the conceptual model. The conceptual framework is presented next, followed by the 12 hypotheses to be examined in the QUAN aspect of the study.

3.2 Theoretical Background

The conceptual model of the study has its theoretical underpinnings in three concepts: the Information System (IS) success model (Delone & McLean 2003), Technology Readiness (Parasuraman & Colby 2015) and e-Gov Public Value approach that represents the impact based on antecedent inputs (Scott, M, DeLone & Golden 2016). The relationship between the three theoretical concepts is illustrated in Figure 3.1.

Figure 3.1: **Relationship between Theoretical Constructs**



The proposed conceptual model seeks to examine these two antecedent characteristics of e-Gov adoption and because of the adoption process a PV impact is created. Besides adoption, this study will also seek to examine impact in terms of PV dimensions. User adoption is a

fundamental element in the deployment of new technologies (Taherdoost 2018). Logically, it is important to know - factors that influence use of a particular system and the factors that lead to a rejection of the same system. These aspects are important considerations at the time of design and development (Mathieson 1991). Having said that, acceptance cannot be equated with success; instead, it is a necessary prerequisite for success (Petter, DeLone & McLean 2008). It is therefore important to look at these two factors, that is, acceptance and success independently yet binding them within a single conceptual framework. Theoretical models such as the IS Success model presented by DeLone and McLean (1992) constitute such an (integrative) attempt.

Further, considering complexities around e-Gov adoption, more than one theoretical model may be required to understand the various issues associated with e-Gov adoption (Taherdoost 2018). This multi-perspective stance is endorsed by Rana et al. (2017), who completed an empirical study of nine different theoretical models on e-Gov adoption. The result of this study was the suggested need for a integrated model. Not much academic literature has theorised e-Gov as a multi-level and multidimensional construct (Bannister & Connolly 2015). In reply to these calls for a integarted and multi-dimensional framework, this study conceptualised e-Gov adoption at both an individual and system level. The resultant three dimensions of the model, system characteristics, individual characteristics and PV are discussed below.

3.2.1 Individual Characteristics

Individual characteristics are the first dimension of the proposed conceptual model captured by the concept of technology readiness or TR, which represents the individual's predispositions to using new technologies (Parasuraman & Colby 2015). TR measures a user's tendency to accept and use new technologies to fulfil personal and work-related goals and the model offers a way to categorise individuals based on their positive or negative technology beliefs (Parasuraman 2000). The model contains four constructs: *optimism*, *innovativeness*, *discomfort* and *insecurity*. Optimism is a positive view of technology; people with this view believe new technology can offer increased control, flexibility and efficiency. Innovativeness is pioneering and a willingness to lead the way – in this case, the use of new technology. Conversely, discomfort indicates a user's inability to use and control technology, while insecurity reflects a tendency to not trust and to have doubts on the capability of new technology to be effective. Innovativeness and optimism are further consolidated as motivators of technology acceptance, while insecurity and discomfort are described as inhibitors of acceptance and adoption (Parasuraman & Colby 2015).

Research shows a very strong influence of technology readiness on consumer attitudes and on adoption of new technologies (Walczuch, Lemmink & Streukens 2007; Wang, Y, So & Sparks 2017). Related studies in e-commerce suggest some level of technology readiness among users is critical, especially in the context of online platforms (Lu, Wang & Hayes 2012; Parasuraman 2000). As e-Gov is innately online-based, investigating the role of technology readiness on e-Gov use is therefore important and necessary.

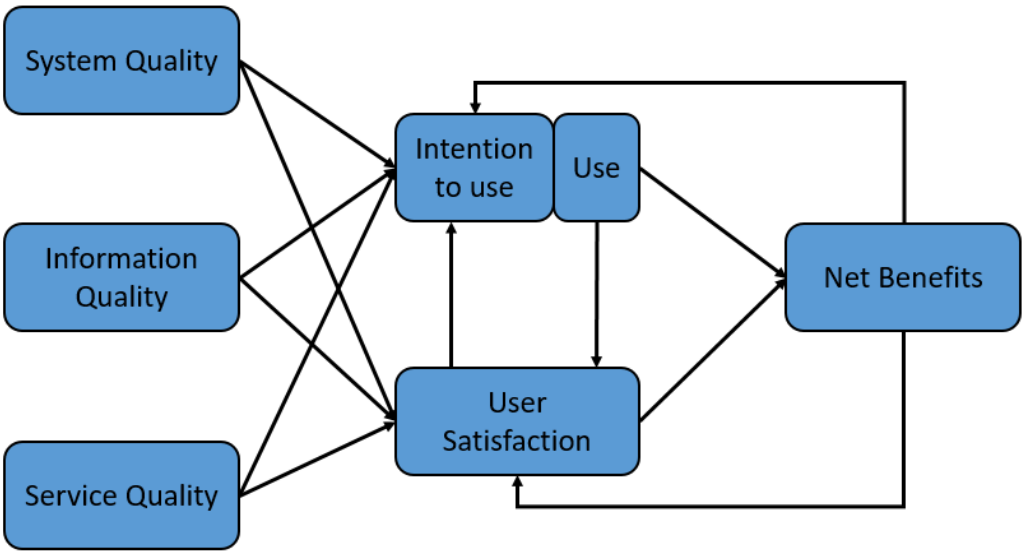
3.2.2 System Characteristics

The fundamental theory underpinning the proposed conceptual framework is the Information System (IS) success model (Delone & McLean 2003). The model comprises six constructs: system quality, information quality, use, user satisfaction, individual impact and organisational impact. The basic premise is that system quality and information quality influence use and user satisfaction, which in turn will create individual impact that collectively will translate into an organisation-wide impact (Delone & McLean 2003).

System quality concerns the desirable features of the information system, such as availability, reliability and ease of use (Petter, DeLone & McLean 2008). Researchers have used perceived usefulness and perceived ease of use extensively to evaluate system quality (McLean & Osei-Frimpong 2017; Petter, DeLone & McLean 2008). Other researchers, instead of measuring performance of the system through the construct of system quality have focused on evaluating output in the form of information quality (DeLone & McLean 1992). In online environments, information quality can be described in terms of relevance, accuracy and comprehensiveness of the information presented on the online platform (Floridi 2013; Teo, Srivastava & Jiang 2008). Information quality is considered as strongly influencing user satisfaction (McLean & Osei-Frimpong 2017).

The original IS success model (DeLone & McLean 1992) was revised later to incorporate a further measure or dimension called service quality (Delone & McLean 2003). The resultant three quality dimensions (system, information and service) and their relationship with other constructs of the model are illustrated in Figure 3.2.

Figure 3.2: Updated IS Success Model (Delone & McLean 2003)



Another update to the earlier IS success model was to replace the constructs of individual and organisational impacts by an aggregate concept of net benefits. This change recognised that impacts of information systems are far beyond individual and organisations alone. Rather, they can potentially affect work groups, industries and even societies (Petter, DeLone & McLean 2008). So, the system under evaluation and the overall context will determine at which level the impact may be created. Instead of complicating the model with further variables and in the interest of parsimony, all impact or benefit categories were grouped into a single measure of net benefits (Delone & McLean 2003). The model is as a result now more generalisable and can be applied to any level of analysis (Petter, DeLone & McLean 2008). This updated IS success model has been widely used, both in its original form and in parts; these respective studies affirm the validity of the model (Michel & Cocula 2017; Petter, DeLone & McLean 2008; Urbach, Smolnik & Riempp 2008).

3.2.3 Public Value.

The success of e-Gov systems can be measured in terms of perceptions of value created by these systems. However there is also significant conceptual ambiguity with the elements of the success dimensions that create public value (Scott, M, DeLone & Golden 2016). Traditional models overlook important dimensions of e-Gov success (Sterrenberg 2016). As such, there is substantial lack of research that examines public value of e-Gov, especially in developing countries (Karunasena & Deng 2012; Twizeyimana & Andersson 2019a).

Public administrations around the world have been using e-Gov as means to improve service delivery, promote interactions between citizens and governments, and improve efficiency

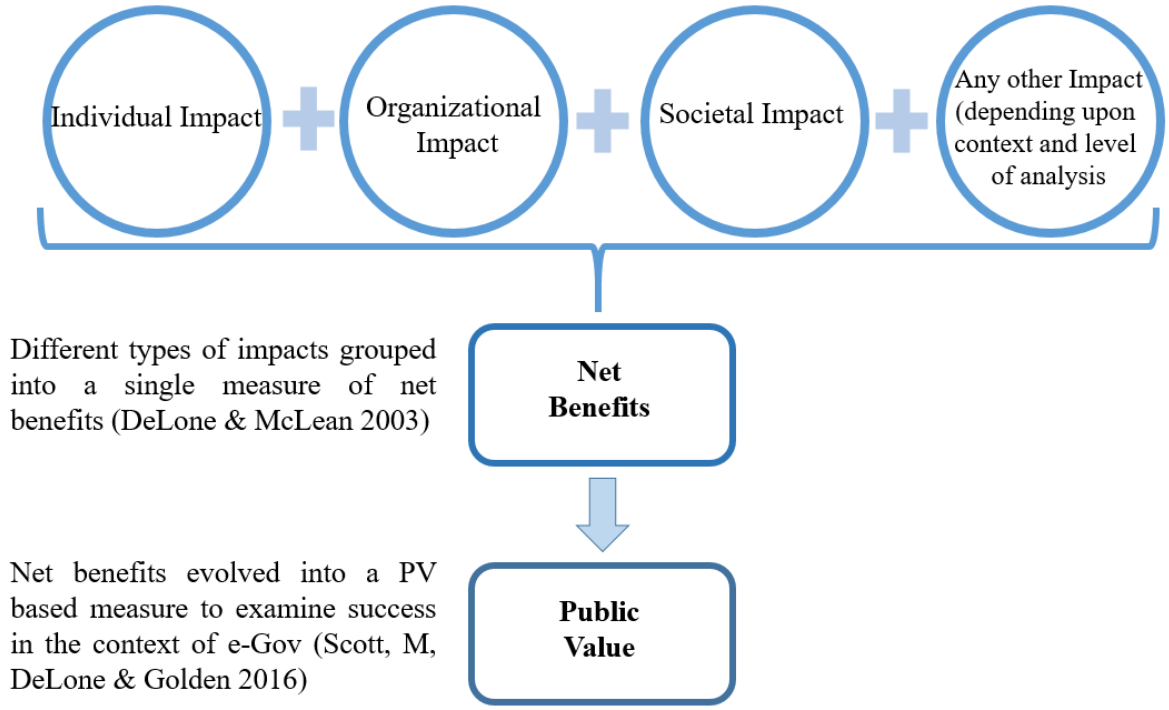
of the public sector agencies (Gauld, Goldfinch & Horsburgh 2010). Considering these benefits, governments spend a lot of money to realise these benefits and whether these investments are justified in terms of the intended outcomes is an emerging research area (Alshawi & Alalwany 2009; Helbig, Gil-García & Ferro 2009). In this backdrop the concept of public value (PV) has gained significant importance as it can be used to evaluate the performance of public services (Moore 1995). The concept of public value first emerged in a seminal study titled *Creating Public Value: Strategic management in government* by Moore (1995). Since then several studies on the subject have appeared (Williams & Shearer 2011; Zhang, Puron-Cid & Gil-Garcia 2015). PV seeks to answer the limitations of New Public Management (NPM), a popular approach that emerged in the 1980s and aimed to improve public sector efficiencies and accountabilities by applying private sector management techniques (Hood 1995).

PV is the value or significance recognised by citizens of their experience of receiving public service and government policies (Moore 1995). It defines a new way of evaluating government in terms of three broad categories: efficiency, effectiveness and advancing social values (Bryson, Crosby & Bloomberg 2014; Stoker 2006). Public value also envisions improvements in social and democratic values like engagement and trust in government (Moore 1995). The resulting value benefits closely resemble the net benefits in the IS success model. Accordingly, in the context of e-Gov research, Scott, M, DeLone and Golden (2016) proposed e-Gov impacts could be assessed using a PV approach incorporating the net benefits of efficiency, effectiveness and improved democracy.

Recalling the previous discussion of IS success model in section 3.2.1, success in terms of individual and organisational impacts as initially proposed by Delone and McLean (1992), evolved into a broader measure of net benefits in the updated IS success model (Delone & McLean 2003). With a wide uptake of IT in the public sector and to evaluate success of e-Gov initiatives, this net benefits measure further evolved to incorporate public value-based net benefits grounded on Moore (1995) PV theory (Scott, M, DeLone & Golden 2016).

This gradual development of net benefits into PV is depicted in Figure 3.3. Since this study aims to examine the impact of e-Gov, it will adopt this public value (PV) based approach to measuring e-Gov impacts (Scott, M, DeLone & Golden 2016).

Figure 3.3: Gradual development of impacts to net benefits and leading to PV



PV is the third element of the proposed conceptual framework – to examine e-Gov impacts. Measuring success in IS has been considered a significant challenge, while evaluating the value created by IS, that too from a public perspective, is even more difficult (Delone & McLean 2003; Scott, M, DeLone & Golden 2016). There is limited research on measuring success dimensions, and often user satisfaction is taken as an alternative measure of success (Petter, DeLone & McLean 2008). The limited research on the area has either focused on employees (Gable, GG, Sedera & Chan 2008) or on e-Gov web sites (Connolly, Bannister & Kearney 2010; Teo, Srivastava & Jiang 2008). In contrast there is inadequate research on ascertaining e-Gov success from the perspective of citizens (Scott, M, DeLone & Golden 2016). Accordingly, there is a need for research focusing on public value of e-Gov from a citizen's perspective.

Moreover, traditional value creation approaches are reported to be primarily driven by short sighted focus on financial considerations (Porter & Kramer 2019). Yet, public managers are expected to balance quality and efficiencies along with concerns of accountability and catering for different public preferences. As a result, measuring success in the public sector is especially challenging. Further, public participation is considered fundamental to success of e-Gov initiatives, and this dimension cannot happen until the users perceive that e-Gov is creating value for them. Therefore, appropriate measures of value perceptions by citizens (or users) is required in e-Gov research (Scott, M, DeLone & Golden 2016; Teo, Srivastava

& Jiang 2008). PV presents such a measure as it can be used to examine values realised by users on the scale of efficiency, effectiveness and improved democracy (Scott, M, DeLone & Golden 2016). This study thus extends Scott's model by integrating it with the IS success model and in doing so, impact measures of the IS success model as it evolved into e-Gov PV will be used. The resultant overall model will be empirically validated.

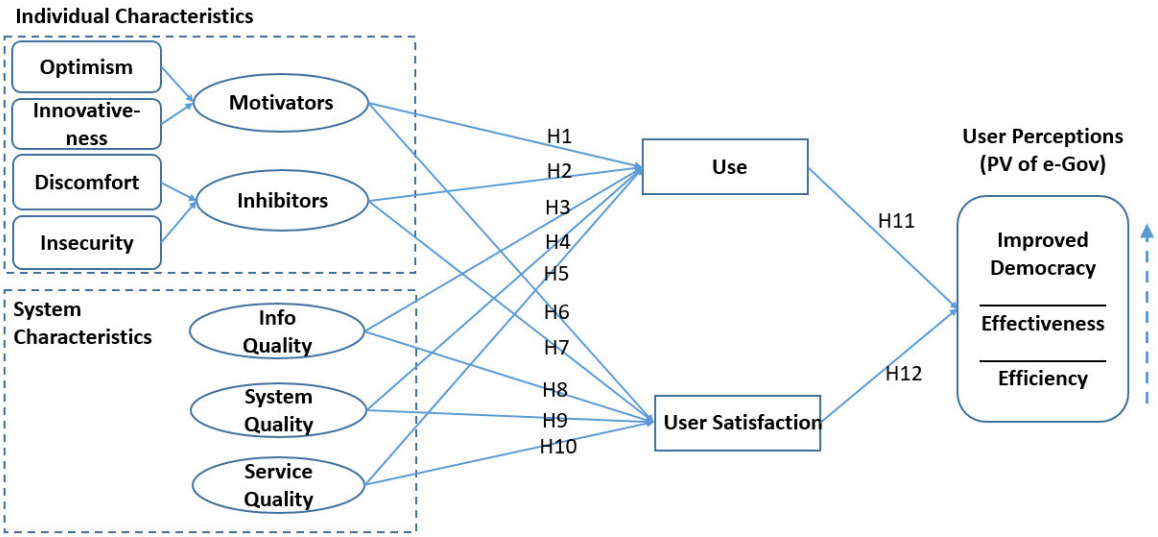
3.3 Conceptual Framework

The choice of variables in a framework depend on the overall context and objective of the study (DeLone & McLean 1992). This view is also echoed by (Jiang & Klein 1999), who note that different success variables may be required depending on the system being examined. This study aims to examine ***adoption*** of e-Gov services, noting the intended users of such services are diverse with needs and capacity to deal with technological innovation (Yen, HR 2005). For some people new technologies bring more convenience to completing tasks, while others may struggle with technology-based encounters (Meuter et al. 2000; Parasuraman 2000). TR can explain adoption behaviour when new technologies are introduced across a diverse group of users and is important in technology adoption modelling (Fisk et al. 2011; Lin, JSC & Hsieh 2006). In view of these considerations, TR is included in the framework as an antecedent. Impacts are downstream and can be assessed by examining value derived from using the relevant system (DeLone & McLean 1992). A PV approach is drawn on to assess user perceptions of impacts created by e-Gov services (Scott, M, DeLone & Golden 2016).

The subsequent research model and conceptual framework is depicted in Figure 3.4, with three main components:

1. Individual characteristics, based on the technology readiness index.
2. System characteristics, adapted from the IS success model.
3. Public value, used to evaluate the impact or the net benefits of e-Gov services that are illustrated in ascending order (efficiency, effectiveness, and improved democracy) for the three defined PV categories.

Figure 3.4: Conceptual Framework – E-Government adoption and Impact assessment model: adapted from Delone and McLean (2003) and Parasuraman and Colby (2015)



3.4 Hypothesis Development

Based on the preceding theoretical discussion, 12 hypotheses are developed (see Figure 3.4). H1 to H5 examine the influence of individual and system characteristics on e-Gov use. Similarly, H6 to H10 examines the influence of individual and system characteristics on user satisfaction, while H11 and H12 deal with the influence of *use* and *user satisfaction* on PV.

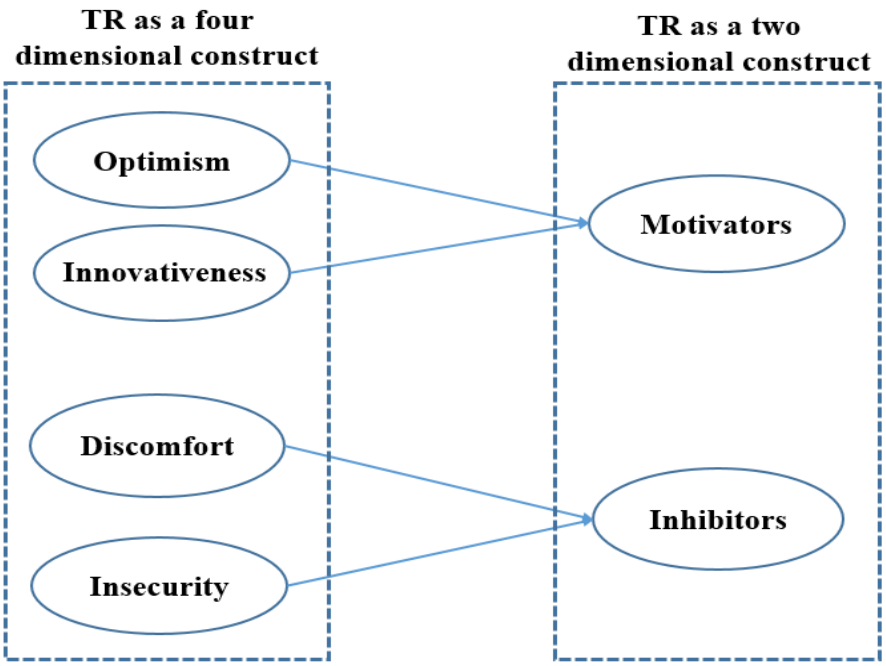
3.4.1 Individual Characteristics (TR) and e-Gov Use

Technology readiness (TR) is a multi-dimensional construct that represents an individual's personal dispositions towards using new technologies (Parasuraman 2000; Wang, Y, So & Sparks 2017). Users who score high on TR tend to perceive new technologies as more useful (Walczuch, Lemmink & Streukens 2007). Conversely, users having low technology readiness will find new technology as intimidating and they are more susceptible to discontinue usage (Zeithaml, Parasuraman & Malhotra 2002), so TR is considered to be strongly related to technology usage (Parasuraman & Colby 2015). Also, as people with high level of TR find technology easy to use and more useful, therefore they have a greater propensity to use it (Blut, Wang & Schoefer 2016).

The Technology Readiness and Acceptance Model (TRAM) has empirically validated the influence of TR on adoption of new technologies (Lin, C, Shih & Sher 2007). In the context of this supporting literature, it is reasonable to assume that an individual's predisposition

about using a technology will influence e-Gov use. Pertinently, TR has been applied in various adoption contexts such as mobile wearable payment (Lee, V-H et al. 2020), cryptocurrency adoption (Alharbi & Sohaib 2021) and mobile services adoption (Chen, S-C, Liu & Lin 2013). As discussed earlier, TR has four dimensions. Optimism and innovativeness are positive traits that motivate a person to use new technology, whereas discomfort and insecurity and negative dispositions and discourage a person to use new technology (Parasuraman & Colby 2015). At this stage there was a consideration to hypothesise TR as a four- or two-dimensional construct (see Figure 3.5).

Figure 3.5: Hypothesising TR as a four- or two-dimensional construct



A review of the literature shows both conceptualisations have been used (Alharbi & Sohaib 2021; Blut & Wang 2020; Chen, S-C, Liu & Lin 2013; Lee, V-H et al. 2020). However, a meta-analysis examining TR and its relationship with technology usage indicated that TR has the best model fit when conceptualised in two dimensions, differentiating between motivators and inhibitors (Blut & Wang 2020). In line with this finding, TR is conceptualised as a two-dimensional construct and the following hypotheses are developed:

H1: Motivators positively influence e-Gov use.

H2: Inhibitors negatively influence e-Gov use.

3.4.2 System Characteristics and e-Gov Use

To examine the influence of system characteristics on e-Gov use, three system quality characteristics are adapted from Delone and McLean (2003) IS success model: information quality, system quality and service quality. Information quality represents the characteristics of information provided by an e-Gov system such as its relevance, accuracy and comprehensiveness (Floridi 2013; Teo, Srivastava & Jiang 2008). Information quality (IQ) has been widely studied in various adoption scenarios. For example IQ significantly influences use in the adoption of mobile learning applications (Wang, Y-Y et al. 2019). Similarly, IQ emerged as a strong determinant of ERP use (Lin, H-Y, Hsu & Ting 2006). Related e-Gov literature also supports the strong influence of IQ on e-Gov use (Rana, Dwivedi, Williams & Lal 2015; Veeramootoo, Nunkoo & Dwivedi 2018; Wang, Y-S & Liao 2008).

System quality concerns the desirable features of an information system that includes availability, reliability and usability (Petter, DeLone & McLean 2008). The IS success model describes system quality as an important element for success (Delone & McLean 2003) and it is a significant predictor of use in different adoption contexts. For example, in a validation of IS success model in e-Gov, Veeramootoo, Nunkoo and Dwivedi (2018), found a strong relationship between system quality and e-Gov use. Similarly, system quality has also been found to strongly influence use (Lin, H-Y, Hsu & Ting 2006; Petter & McLean 2009; Wang, Y-Y et al. 2019).

The third dimension of system characteristics in the IS success model is service quality. Service quality represents responsiveness, ease of use and problem resolution (Teo, Srivastava & Jiang 2008). Previous e-Gov literature has shown that a higher degree of service quality leads to greater system use (Rana, Dwivedi, Williams & Weerakkody 2015). Related IS literature has also reported strong support for the positive influence of service quality on use (Wang, Y-S & Liao 2008; Wang, YS 2008). In view of the above discussion, the following relationships are hypothesized.

> **H3**: There is a significant, positive relationship between information quality and e-Gov use.
> **H4**: There is a significant, positive relationship between system quality and e-Gov use.
> **H5**: There is a significant, positive relationship between service quality and e-Gov use.

3.4.3 Individual Characteristics (TR) and User Satisfaction

As discussed earlier individual characteristics are operationalised in terms of TR dimensions. Literature has found strong influence of a person's individual characteristics and user satisfaction (Teo, Srivastava & Jiang 2008). To elaborate this point further, people with high TR are likely to generate more value and experience greater satisfaction from the technology (Blut & Wang 2020). Arguably, people with high TR will find technology encounters more stimulating and will achieve greater satisfaction, while conversely, people with low TR will get overwhelmed when they encounter technology, resultantly their overall experience will be less satisfactory (Blut & Wang 2020).

In an empirical study in the context of self-service technologies–technology interfaces which allow services to be obtained without employee interaction like e-Gov services, TR had a significant influence on user satisfaction (Lin, J-SC & Hsieh 2007). Related literature in varying contexts also suggests strong influence of TR on user satisfaction (Blut & Wang 2020; Liljander et al. 2006; Mattila & Mount 2003; Wang, Y, So & Sparks 2017). Pertinently, the relationship between TR and user satisfaction is even more direct in the contexts where technology plays a central role, such as mobile-based services or electronic books or e-Gov services (Chen, S-C, Liu & Lin 2013; Ferreira, da Rocha & da Silva 2014). In view of the preceding discussion and using a two-dimensional conceptualisation of TR in terms of motivators and inhibitors, following hypotheses are proposed:

H6: Motivators positively influence user satisfaction.

H7: Inhibitors negatively influence user satisfaction.

3.4.4 System Characteristics and User Satisfaction

As discussed earlier, the IS success model refers to information quality as a desirable characteristic of the output of an information system. Contextual factors are also important in considering the relationship between information quality and user satisfaction. As such, information quality has greater influence on user satisfaction for people looking for e-services information, as compared to those searching for product information. This is because in the former case, user need is actually information itself while in the latter, information serves to obtain the product (Saeed, Hwang & Mun 2003). As e-Gov is primarily used to deliver services as well as information, information quality is hypothesised to strongly influence user satisfaction. In a related study in Taiwan on e-commerce success

employing the IS success model, information quality was found to strongly influence user satisfaction (Wang, Y-S & Liao 2008).

According to the IS success model, a major component of user satisfaction is predicated by information quality (Laumer, Maier & Weitzel 2017; Petter, DeLone & McLean 2008). Several scholars consider information quality to be a fundamental component of user satisfaction instead of treating it as a unique construct (Gable, GG, Sedera & Chan 2008; Petter, DeLone & McLean 2008). A meta-analysis by Petter and McLean (2009) found a strong relationship between information quality and user satisfaction. In view of the above the following hypothesis is proposed:

> **H8**: There is a significant, positive relationship between information quality and user satisfaction.

System quality refers to the "desirable characteristics of an information system for example ease of use, system reliability and response time" (Petter, DeLone & McLean 2008). As such, the most frequently used measure of system quality is perceived ease of use (PEOU). (Petter, DeLone & McLean 2008). Literature suggests system quality as an important determinant of user satisfaction since users having low satisfaction tend to avoid using the system (Laumer, Maier & Weitzel 2017). When users perceive system as having negative characteristics they are less satisfied with the system (Petter, DeLone & McLean 2008; Rai, Lang & Welker 2002). The relationship between system quality and user satisfaction is well grounded in the literature (Petter, DeLone & McLean 2008; Petter, DeLone & McLean 2012). Accordingly, a further hypothesis is proposed to test the relationship between system quality and user satisfaction:

> **H9**: There is a significant, positive relationship between system quality and user satisfaction.

Service quality is the quality of support received by users of an information system such as IT support, training or help desk support (Petter, DeLone & McLean 2012). It may also be seen as perceptions of excellence about any service (Akter, Ray & D'Ambra 2011). According to the IS success model, service quality influences user satisfaction (Laumer, Maier & Weitzel 2017). Hence, user satisfaction will be low if the service quality is poor (Petter, DeLone & McLean 2008).

Literature suggests the strong positive influence of service quality on user satisfaction (Felix 2017). In the context of e-Gov adoption, information quality did strongly influence user

satisfaction (Wang, Y-S & Liao 2008). Strong support for the relationship between service quality and user satisfaction was found in a meta-analysis of 71 studies, where service quality significantly guided user satisfaction (Sabherwal, Jeyaraj & Chowa 2006). As the above discussion shows significant evidence of influence of service quality on user satisfaction, the following additional hypothesis is suggested:

> **H10**: There is a significant, positive relationship between service quality and user satisfaction.

3.4.5 Use, User Satisfaction and PV

As discussed in section 3.2.3, the construct of PV represents the net benefits of the IS system (Scott, M, DeLone & Golden 2016). As such, it is important to clearly define the context and stakeholders where net benefits are to be measured, since different stakeholders may have diverging views on what constitute net benefits (Delone & McLean 2003). Primary stakeholders for this study are e-Gov users, so net benefits are perceptions of value realised by these users and citizens. Perceptions of net benefits or PV are captured in terms of efficiency, effectiveness and improved democracy (Scott, M, DeLone & Golden 2016).

The IS success model provides strong evidence of a relationship between the three constructs of use, user satisfaction and the net benefits. Positive experience with e-Gov use will result in increased user satisfaction, because of this *use* and *user satisfaction* some net benefit will be realised and a perception of value will be created for citizens (Wang, Y-S & Liao 2008). In the context of e-Gov, satisfaction is a citizen's assessment of how well government services met their expectations; and is strongly related to perceived value (Li, Y & Shang 2020). Kearns (2004) used the concepts of PV and argued that user satisfaction is a key criterion to evaluate the success of e-Gov initiatives from the citizen's perspective (Omar, Scheepers & Stockdale 2011). Similarly, a study conducted by Scott, M, DeLone and Golden (2016) to measure the success of e-Gov based on a public value approach, found a significant influence of user satisfaction on citizens' value perceptions. Empirical evidence suggests value or net benefits are created by system use and realised user satisfaction (Alawneh, Al-Refai & Batiha 2013; Freeze et al. 2010; Wang, Y-Y et al. 2019; Wang, YS 2008). In view of above discussion, it is posited that:

> **H11:** E-Gov use positively influences user perceptions of public value creation.
>
> **H12:** High user satisfaction will positively influence user perceptions of public value creation.

3.5 Summary

This chapter discussed the theoretical underpinnings of the conceptual model that is employed in this study. The model comprises the three main elements of individual characteristics, system characteristics and public value of e-Gov. Individual characteristics are derived from the concept of Technology Readiness (Parasuraman & Colby 2015) while system characteristics are based on the Information System (IS) success model (Delone & McLean 2003). An e-Gov Public Value approach is used to examine impact (Scott, M, DeLone & Golden 2016). Based on the relevant literature, 12 hypotheses are developed. The next chapter (Chapter 4) will discuss the methodology to test these hypotheses, while Chapter 5 will present the results of hypotheses testing.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

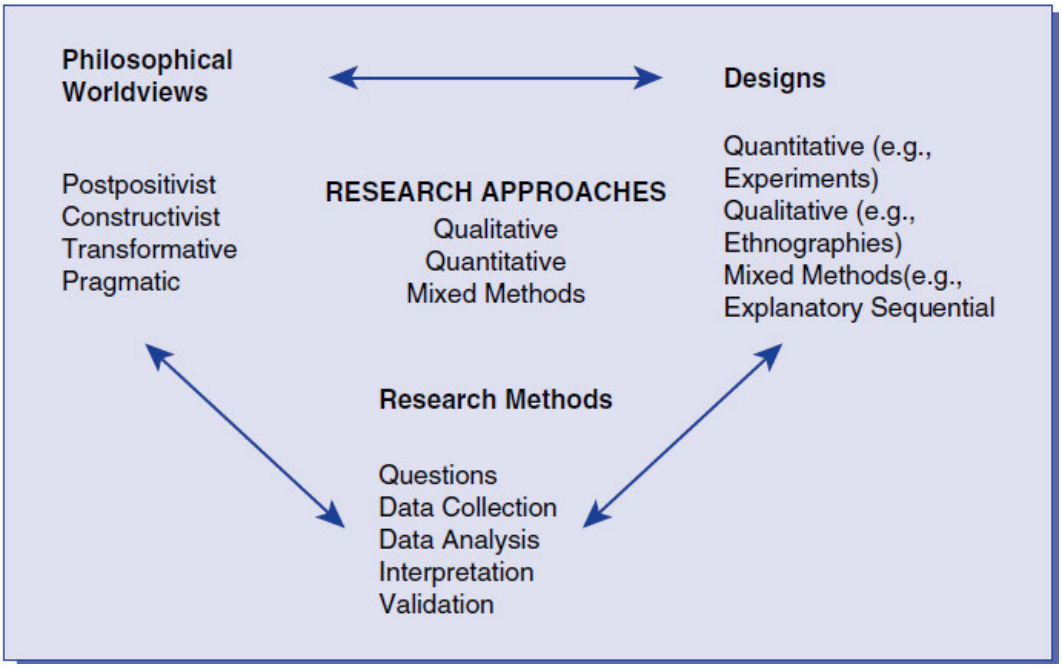
The previous chapter outlined the conceptual framework used to develop and test research hypotheses in the quantitative phase of study. To recall, research question RQ1 is: *what is the interplay between technology and individual characteristics on adoption of e-Gov services in an emerging economy like Pakistan?* Twelve hypotheses were framed to answer RQ1 and the associated research objectives. Quantitative methods serve to answer this research question. Analysis and discussion of findings are in Chapter 5. The second research question, RQ2 is: *how can governments support adoption and creation of PV in an emerging economy such as Pakistan?* This research question and the associated research objectives are answered using qualitative methods, with the discussion of findings in Chapter 6.

This chapter details the methodological approach adopted to answer both quantitative (QUAN) and qualitative (QUAL) phases of the research. The rationale for the specific methodological choices in both QUAN and QUAL phases of the study is stated. The chapter begins by noting the broad philosophical world views and progressively narrows down to fine methodological details to achieve the respective RQs and research objectives. Pragmatism is identified as the most appropriate philosophical worldview for this study. Next, the different research approaches are introduced and the rationale for adopting a mixed methods approach is discussed. This is followed by describing the strategies used for quantitative and qualitative data collection. Later, different data analysis techniques and the ethical considerations are discussed.

4.2 Research Framework

The research framework involves detailing a broad plan for the conduct of a research-based study. The important considerations for this framework are philosophical worldviews held by the researcher, research design and specific methods adopted to achieve the research objectives (Creswell 2014). Figure 4.1 shows the relationship between these dimensions. The philosophical view is a set of broad assumptions that a researcher holds about the study. The research design conforms to this philosophical worldview and the research methods adopted serve to translate the chosen approach into practice (Creswell 2014). The subsequent sections will discuss all these elements of a research framework and provide a rationale for choosing specific approach and methods for this study.

Figure 4.1: Research framework (Creswell 2014)



4.3 Philosophical Worldview

Research is a knowledge-creation endeavour, with research philosophy related to the nature and development of that knowledge (Saunders, Lewis & Thornhill 2009). Knowledge creation can be in terms of contributing to a new theory or solving a problem in a specific organisational context, with research philosophy reflecting fundamental assumptions of how a researcher views the world. These assumptions in turn guide research design and research methods adopted by the researcher (Saunders, Lewis & Thornhill 2009).

Three different philosophical worldviews are widely discussed in literature: post-positivism, constructivism, and pragmatism. A post-positivist worldview is often referred to as science research or the scientific method; it is also known as positivist research and empirical science (Creswell 2014). Positivism is about the science of facts and laws (Teddlie & Tashakkori 2009) and positivist researchers hold a view that 'causes influences outcomes', such as in experiments and research hypothesis (Creswell 2014). A positivist researcher believes that social phenomena are measurable and that knowledge is developed as a result of measuring objective reality (Creswell 2014). This world view aligns with a quantitative approach.

Some researchers are, however, critical of a positivist view. Rather, they believe that social and management sciences are too complex to be reduced to only law-like generalisations

(Saunders, Lewis & Thornhill 2009). Researchers with this view generally align with a research philosophy called constructivism which is sometimes combined with interpretivism (Creswell 2014). Social constructivists believe that individuals develop subjective meanings from their experiences, and a constructivist researcher uses a participant's view of phenomena being studied. The meanings of the situation are constructed based on discussions with participants (Creswell 2014). This world view aligns with a qualitative approach to research.

Somewhere in between these divergent worldviews is another position, known as pragmatism. In the view of a pragmatist, the research question drives the overarching philosophy (Saunders, Lewis & Thornhill 2009). That is, a pragmatist researcher does not commit to any one philosophy. Rather, he or she employs all available approaches to understand a specific problem (Creswell 2014). This worldview aligns with the mixed methods research.

This study adopted a pragmatic view as the primary driver for the study. This position allowed the researcher to simultaneously address the confirmatory and exploratory questions in the study (Teddlie & Tashakkori 2009). Confirmatory research aims to test a-priori research hypotheses based on existing theory (Jaeger, RG & Halliday 1998), while exploratory research is observational (Jaeger, RG & Halliday 1998) and aims to explore unknown aspects of an issue (Saunders, Lewis & Thornhill 2009). The confirmatory research question of this study (RQ1) is addressed using twelve hypotheses.

To address the exploratory phase a second research question, RQ2, was devised with the following subordinate ROs:

- **RO 2.1:** Identify the key PV issues that help/hinder creation of public value
- **RO 2.2:** Identify enabling and constraining factors that influence citizens' adoption of e-Gov and creation of PV in an emerging economy like Pakistan; and;
- **RO 2.3**: a summative objective related to both RQ1 & 2 is as follows: Develop a policy and practice framework to support successful adoption and creation of PV in an emerging economy.

These three ROs are exploratory in nature and qualitative methods are appropriate to address RQ2. Since both QUAN and QUAL methods are required to address the identified RQs, a pragmatist view is best suited to this study.

4.4 Research Approach

The philosophical world view of the researcher and nature of problem dictate the approach of the study (Creswell 2014). Subsequent methods of data collection and data analysis techniques are contingent upon the approach. Three most common approaches are quantitative (QUAN), qualitative (QUAL) and a mixed methods approach, that combines both QUAN and QUAL methods. Following sections briefly discuss all three approaches and then discusses the rationale for choosing the mixed methods approach for this study.

4.4.1 Quantitative Approach

A quantitative approach is based on a post-positivist worldview. This approach tests a theory by investigating relationships between variables using survey instruments and quantitative data is analysed using statistical procedures (Creswell 2014). Quantitative approaches are based on deductive reasoning, where the research inquiry begins with a theory at hand. This theory forms a basis for suggesting hypotheses that are accepted or rejected on the basis of quantitative data (Bell, Bryman & Harley 2018; O'Reilly 2008). Furthermore, quantitative studies allow a researcher to generalise and replicate the findings to the wider population from where participants are recruited (Sukamolson 2007). However, critics of a quantitative approach say that although it gives breadth to the study due to large sample size, such an approach lacks the depth to fully explain a phenomenon under investigation (Sukamolson 2007; Venkatesh, Brown & Bala 2013). Furthermore, as a quantitative researcher begins with a theory in mind, deductive research merely tests an existing theory and therefore lacks the ability to develop new perspectives or explanations (O'Reilly 2008).

4.4.2 Qualitative Approach

A qualitative approach has its philosophical underpinnings in a constructivist worldview. The approach seeks to understand views and meanings of a social problem from the standpoint of the individual or group (Creswell 2014). Qualitative approaches are typically used for explanatory studies and involve non-numerical data collected via such approaches as group discussions, focus groups or 1:1 interviews to investigate concepts and beliefs of participants (Hammarberg, Kirkman & de Lacey 2016). Analysis of QUAL data is based on inductive reasoning, where the researcher begins with no existing predisposition and gradually develops a working theory from the data (Saunders, Lewis & Thornhill 2009). Although s qualitative approach is able to provide rich insights into the research problem, qualitative studies are context-based, and therefore transferability or wider generalising of the findings to other settings is challenging (Venkatesh, Brown & Bala 2013).

4.4.3 Mix-Methods Approach

A mixed methods approach is based on pragmatic worldview, incorporating both quantitative and qualitative data that is integrated into a single research inquiry (Creswell 2014; Venkatesh, Brown & Bala 2013). This approach is based on the premise that integration provides a more thorough understanding of the phenomena under study than if examined independently (Creswell 2014). Quantitative data is closed-ended and gathered from survey instruments, while qualitative data is open-ended. The mixed methods approach is based on the premise that both QUAN and QUAL methods of data collection have inherent weaknesses that can be neutralised by collecting both types of data (Creswell 2014). Any triangulation achieved as a result provides a deeper understanding of the issue(s) under examination (Creswell 2014). Table 4.1 compares all three research approaches.

Table 4.1: Comparative view of three research approaches (Creswell 2014; Teddlie & Tashakkori 2009).

	Quantitative	**Qualitative**	**Mixed-Methods Approach**
Philosophical assumptions	• Post-positivist	• Constructivist	• Pragmatic
Strategies of enquiry	• Experiments and surveys.	• Phenomenology, grounded theory, narrative, ethnography, case study	• Sequential, parallel and transformative
Methods	• Closed-ended questions. • Predetermined approaches • Numeric data	• Open-ended questions. • Emerging approaches. • Test or image data	• Both open-ended and closed-ended. • Both predetermined and emerging approaches. • Both QUAN and QUAL
Practices of research	• Test or verify theories. • Relates variables in in questions or hypothesis. • Employ statistical procedures	• Focus on meanings. • Study context and participant settings. • Create an agenda for change and reform	• Collects both QUAN and QUAL data. • Develop a rationale for mixing. • Practices of both QUAN and QUAL research and employed
Form of data	• Numeric	• Narrative	• Numeric and narrative
Data analysis	• Statistical analysis • Descriptive and inferential	• Thematic strategies • Categorical and contextualising	• Integration of thematic and statistical.

4.4.4 Rational for using the Mix-Methods Research (MMR) Approach

This study adopted a mixed methods (MM) approach for several reasons. First, it makes it possible to simultaneously address confirmatory and exploratory questions in the same study and so verify and generate theory (Teddlie & Tashakkori 2009).

Second, a mixed methods research allows a researcher to construct a more complete picture of the problem under study (Teddlie & Tashakkori 2009) and is especially beneficial when studying complex concepts such as PV. E-Gov is a complex multi-stakeholder issue (Helbig, Gil-García & Ferro 2009) and has its theoretical roots in multiple disciplines (Chen, H et al. 2007; Molnar, Janssen & Weerakkody 2015; Scholl, HJ 2014; Yusuf, Adams & Dingley 2014). The research framework for the study is based on the Information System Success model (Delone & McLean 2003) and Public Value Theory (Moore 1995). A mono-disciplinary approach is consequently unable to truly capture many of today's technical and social issues (Tobi & Kampen 2018). E-Gov is an issue that requires negotiating complex relationships between diverse social actors (Helbig, Gil-García & Ferro 2009). Such complex and diverse issues are best understood by employing a MM research approach (Kallemeyn, Hall & Gates 2020). A MM approach provides the breadth and depth to a study of the issues under investigation (Timans, Wouters & Heilbron 2019).

Third, different methods are appropriate to answer different types of research questions (Molina-Azorin 2016). This view is borrowed from Patton (1990) "*Paradigm of Choices,*" which advocates choosing a method on the basis of appropriateness for answering a research question. This study envisages two research questions and five subsequent research objectives. RQ1 concerns the *interplay between technology and individual characteristics on adoption of e-Gov services in Pakistan.* Adoption is a relatively well-researched social phenomenon and there are many theories that explain adoption. These include Diffusion of Innovation (Rogers 2010); Unified Theory of Acceptance and use of Technology (UTAUT) (Venkatesh et al. 2003) and Information System Success Model (Delone & McLean 2003). To answer RQ1, the study builds on the Delone and McLean (2003) IS success model. This RQ seeks to answer 12 hypotheses and this phase of the study is confirmatory in nature. Therefore, a quantitative approach to testing hypotheses is well suited to answering the research question and related ROs. Accordingly, the first phase of the study is a deductive approach, wherein hypotheses are formulated and are empirically tested.

RQ2 is exploratory, and seeks to examine *how governments can support adoption and creation of PV in an emerging economy such as Pakistan?* Examining public value created

by e-Gov initiatives is an emerging research area (Scott, M, DeLone & Golden 2016; Suri 2017) and the research question is exploratory in nature, so qualitative approach is best suited to answer the question. Therefore, to address both confirmatory and exploratory research questions of the study, a mixed methods approach is found a suitable for this study.

Another important consideration for utilising the mixed methods approach is multilevel design of the study. The QUAN data is collected from citizens, enabling a bottom-up picture of issues concerning e-Gov adoption, and to a lesser extent the creation of PV, in Pakistan. The QUAL data is collected from e-Gov managers and practitioners to get a top-down view of the research issue. This line of investigation is also supplemented by two open-ended questions to survey respondents. Seeking both citizen and practitioner view allows for multilevel mixing (Teddlie & Tashakkori 2009) and this multilevel view will help to discover any gaps in policy and actual implementation.

Finally, the epistemological stand reflects a researcher's own perspective of their world view and his/her past experiences (Creswell 2014). The researcher has chosen a pragmatic approach not only for the above reasons, but also because it best reflects the researcher's perspective when looking at modern day problems. In taking this position, the researcher is reassured by the stance of Brannick and Coghlan (2007) who state: "*Researchers' epistemological and ontological perspectives legitimate their own distinctive way of doing research and determine what they consider as valid, legitimate contribution to knowledge or theory irrespective of whether we called it development, confirmation, validation, creation, building or generation*".

4.5 Research Design

Research design is a structured plan for executing a research project (Leavy 2017). In the view of Lavrakas (2008), research design is a conceptual blueprint for answering specific questions. It details the research context and elaborates data collection and analysis methods and essentially guides the research from its start to finish (Lavrakas 2008). As this study aligns with a pragmatic world view, a mixed methods design is employed, and both quantitative and qualitative data are collected to answer the research questions. Every design has its weaknesses and bias and mixing both quantitative and qualitative data allows to overcome the limitation of individual designs (Creswell 2014). There are two well-known mixed methods designs: firstly, parallel mixed methods (MM) design; and secondly, sequential MM design (Teddlie & Tashakkori 2009).

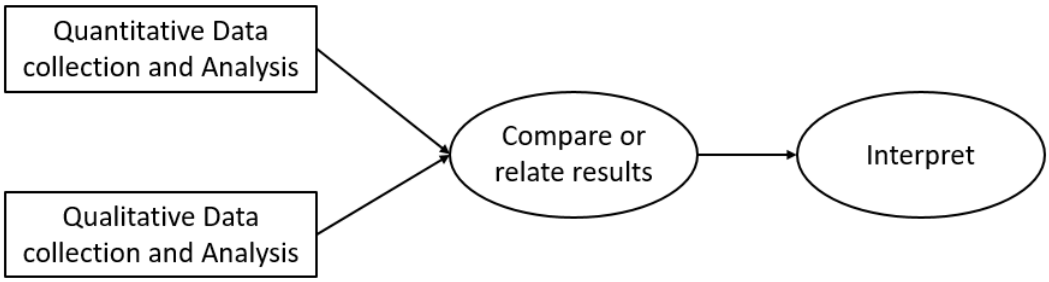
4.5.1 Sequential Mixed Methods

In a sequential MM design, the quantitative and qualitative phases occur in a given order. One phase of the study informs the other phase. The research questions for both quantitative and qualitative phases are interlinked (Teddlie & Tashakkori 2009). This approach is not adopted in this study.

4.5.2 Parallel Mixed Methods

In a parallel MM design both QUAN and QUAL data are collected and analysed at the same time (Creswell 2014). Figure 4.2 illustrates a convergent parallel MM designs where both QUAN and QUAL data are collected simultaneously and results converged and findings are interpreted (Creswell 2014). This study adopted a convergent parallel mixed methods approach, where one phase of the study does not rely on the output of the other phase.

Figure 4.2: Convergent parallel mixed methods approach (Creswell 2014)



4.5.3 Mixed Methods Design Criteria

Several factors need to be considered when designing a mix methods study. The first question to be answered in a MM design is naturally whether this study will use only one (either QUAN or QUAL) or both methods. If the study adopts both it is a mixed methods design. The next important consideration is how many strands or research phases there will be. A strand or phase of a research study includes three distinct stages: i) conceptual stage, ii) experiential stage, and iii) inferential stage (Teddlie & Tashakkori 2009). The third important design consideration is whether the QUAN and QUAL data collection occur in sequential or parallel manner? Table 4.2 list different design considerations considered for this study.

Table 4.2: Mix Methods design criteria

Criteria	Design Questions	Possible values	Remarks
Number of methodological approaches	Will this study only involve one or both methods (Quantitative and Qualitative)?	Mono-methods study. Mixed-methods study	*The study involves using two methods (both QUAN and QUAL). Therefore, it is a mixed methods design.*

Number of strands or phases	Will the study involve one phase or multiple phases?	Mono-strand Multi-strand	*Multi-strand (separate conceptualisation, experiential and inferential stage for both QUAN and QUAL phases)*
Types of implementation process	Will the QUAN and QUAL data collection occur in parallel or in a sequential manner?	Parallel Sequential Conversion Multilevel Combination	*Data collection will occur in a parallel manner. Therefore, it is parallel mix methods design*

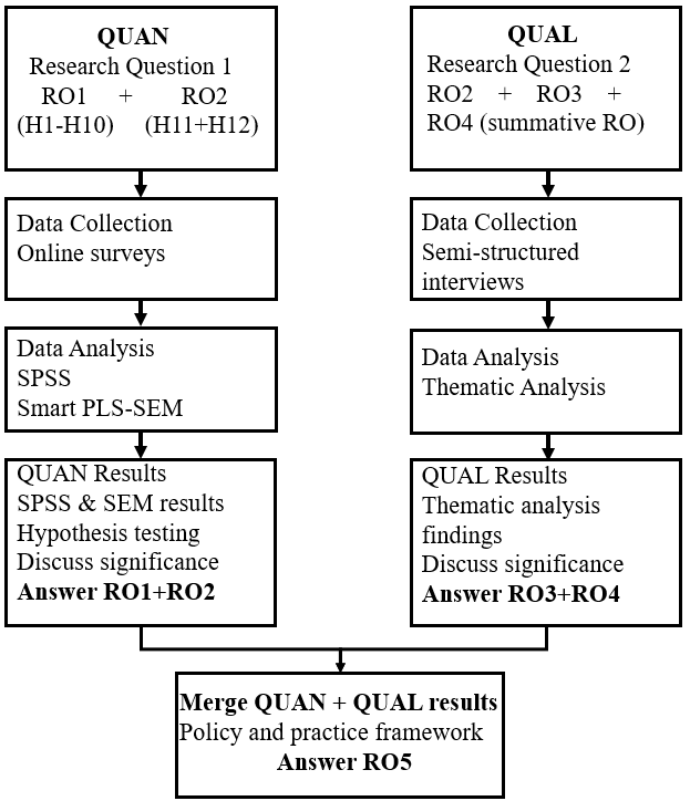
The conceptualisation stage involves conceiving the research problem and questions. The experiential stage involves data collection and analysis, whereas the inferential stage includes explanations and inferences about collected data (Teddlie & Tashakkori 2009). A traditional QUAL or QUAN study is a mono-strand study, whereas a sequential or parallel mixed methods designs is a multi-strand study (Teddlie & Tashakkori 2009). For the conceptual stage, this study devises separate but related research questions for both quantitative and qualitative phases. Quantitative data is collected through an online survey and qualitative data is collected through semi-structured interviews. For the purpose of analysis, the quantitative data is evaluated using SPSS and Structural Equation Modelling (SEM), whereas qualitative data requires thematic analysis.

The next design consideration is whether the QUAL and QUAN data is collected at different level of analysis. Multilevel mixing occurs when this is the case (Teddlie & Tashakkori 2009). For example in a multilevel mixed methods design data may be collected at two levels such as: student and school, employee and company, patient and medical practices, household and neighbourhood, inhabitant and community (Schoonenboom & Johnson 2017). This study adopts a multilevel mixing collecting QUAN data for citizen level and QUAL data from the practitioner level. Results are integrated into e-Gov policy and practice framework. Such a design not only involves collecting quantitative and qualitative data at different levels but also requires integrating data at different levels of analysis. There is very limited published research that has discussed integration of multilevel mixed methods research (Headley & Plano Clark 2020; Schoonenboom & Johnson 2017). The methodological approach devised for this study seeks to fill, in part, this methodological void.

As discussed earlier, the study is confirmatory-exploratory in nature, with a QUAN approach addressing the confirmatory phase involving hypotheses testing using SEM. A QUAL approach addresses the exploratory phase which involves identifying key issues that

help create Public Value (PV) and identify enabling and constraining factors that influence adoption of e-Gov and creation of PV. Figure 4.3 illustrates the design and implementation stages of the convergent parallel mixed methods approach adopted for this study (Teddlie & Tashakkori 2009).

Figure 4.3 : Overview of the Mixed-Methods research implementation stages



Research implementation involved four broad stages. In the first stage research question and research objectives are devised. The second stage involves data collection. For the quantitative part a survey instrument based on similar studies is developed. The survey data was collected using online self-administered questionnaires. For the qualitative part of the study, semi-structured interviews are conducted. Interviews were initially planned to be conducted at Islamabad, but due to COVID-19 travel restrictions alternative arrangements were organised and telephonic / online interviews were conducted. The next phase was to analyse the collected data using quantitative and qualitative methods and discuss the findings. The QUAN data was initially assessed using SPSS. Detailed quantitative analysis and hypothesis testing was then done using Smart PLS-SEM. Qualitative data was analysed using NVivo. The QUAN phase answers RO1 and RO2, whereas the QUAL strand addresses RO3 and RO4. Finally, both qualitative and quantitative findings were synthesised to develop a policy and practice framework in fulfilment of RO5.

4.6 QUAN Implementation considerations

RQ 1 seeks to examine the *interplay between technology and individual characteristics on adoption of e-Gov services in an emerging economy like Pakistan?* To answer this question two research objectives (RO) are developed to: i) examine the interplay between individual and system characteristics on adoption of e-Gov services (*in terms of use and user satisfaction*); and ii) examine the success of e-Gov services from a citizen perceptions point of view measured in terms of public value dimensions. Both ROs are addressed using twelve hypotheses. To address these ROs a conceptual framework adapted from IS success model (Delone & McLean 2003) and e-Gov PV theory (Scott, M, DeLone & Golden 2016) is tested and validated. Quantitative data is collected using an online survey to test and validate the conceptual framework. The following section details the QUAN phase implementation considerations.

4.6.1 Sampling Strategy

Sampling occurs when a researcher takes a small portion from a population, gathers research data from the sample and generalise findings applicable to the whole population (Salkind 2010). Population is a group of all possible cases of potential participants (Saunders, Lewis & Thornhill 2009). Although for some studies it may be possible to collect data from entire population (called a census), sampling is a valid alternative to a census in cases where it is impractical to study entire populations or where budgetary or time constraints are evident (Saunders, Lewis & Thornhill 2009). The population for this study comprised citizens of Pakistan with access to smart mobile phone devices. As the study is bounded by time and financial constraints, it is impossible to study the entire population, so a sampling technique is adopted, of which there are two kinds: i) probability sampling, and ii) non-probability sampling. In the former all samples have equal chance of being selected from the entire population, while in the latter the probability of each sample being selected from the population is not known (Saunders, Lewis & Thornhill 2009).

Non-probability sampling can in turn be categorised into different types such as convenience sampling, quota sampling, purposive sampling and self-selection. In convenience sampling a researcher selects the cases most convenient to obtain, and the process is continued until the required sample size is obtained. Quota sampling is type of stratified sampling and is completely non-random. It is generally used for interviews and is based on the notion that quotas are allocated in a way to represent variability in the population (Saunders, Lewis & Thornhill 2009). With purposive sampling, the researcher

exercises his/her judgement to select samples which can lead to answers to the RQs. While using a purposive sampling, the researcher is able to ensure that a wide variety of respondents is chosen from the population (Saunders, Lewis & Thornhill 2009). Snowball sampling is used when members of the intended population are not easily identifiable. In such cases a few cases are identified and these are in turn asked to identify other cases and the process is continued until no new case is identified (Saunders, Lewis & Thornhill 2009).

One of the important considerations at this stage of the study is to select the sampling technique among probability or non-probability sampling techniques. The first step for a probability sampling is to identify a suitable sampling frame (Saunders, Lewis & Thornhill 2009). Sampling frame is a list of all possible cases in a population and is essentially required for probability sampling. It was practically not possible to identify all people using e-Gov services or to obtain a suitable sampling frame for online surveys (Wright 2005), and therefore probability sampling cannot be used for this study. In such cases non-probability sampling techniques are a suitable alternative to address research questions and objectives (Saunders, Lewis & Thornhill 2009). In non-probability sampling techniques, it is the quality of the theoretical inferences drawn from collected data that determines the extent to which generalisations can be made (Saunders, Lewis & Thornhill 2009).

The next important consideration is to identify a sampling technique within the non-probability sampling. Researcher should consider the factors of feasibility and sensibility of collecting data to answer the stipulated research questions (Saunders, Lewis & Thornhill 2009). As this study aims to examine e-Gov adoption and PV creation which is innately dependent upon online and web-based technologies, online survey is a natural choice. Online surveys are particularly advantageous to reach some individuals and communities which otherwise are difficult to find in offline settings, for example e-stock trading (Wright 2005). Besides, online surveys are cost-effective and can be efficiently administered (Wright 2005). Viewing these considerations online survey is used to collect quantitative data. To collect QUAN data a combination of convenience and snowball sampling techniques are used as these sampling techniques are cost-effective, quick to deploy and meet the objective of this research (Saunders, Lewis & Thornhill 2009). Such a method to combine different sampling techniques has also been suggested by (Saunders, Lewis & Thornhill 2009) to meet the research objectives.

4.6.2 Sample Size

Once the sampling technique has been selected, the next important step in the research process is to determine an appropriate sample size. In studies where non-probability sampling techniques are used, the issue of determining sample size is ambiguous (Saunders, Lewis & Thornhill 2009). Rather, sample size depends on the RQs and ROs, what the researcher needs to find out, what will have credibility and what is practical given the resources and time available (Saunders, Lewis & Thornhill 2009). An important consideration in determining the sample size is type of data analysis required (Hair Jr et al. 2014). The quantitative data analysis technique used for this study is Structured Equation Modelling (SEM) using SmartPLS. It is difficult to suggest a minimum absolute sample size for SEM, but 200 is deemed to be the minimum sample size for SEM (Kline, RB 2015).

As well, there are two types of SEM, Co-variance Based (CB)-SEM and Partial Least Squares (PLS)-SEM. CB-SEM requires several model assumptions including multivariate normality and sample size to be fulfilled, while PLS-SEM can work with even a small sample size (Hair Jr, Joe F et al. 2017). Although some researchers believe that sample size does not have any significant consideration in SmartPLS, as a rule of thumb sample size should be greater than ten times the largest number of structural paths directed at a particular construct in a SEM structural model. To put it simply, the minimum sample size must be 10 times the maximum number of arrowheads pointing at any variable in the SEM structural model (Hair Jr et al. 2014). Viewing this guideline, the maximum number of arrows pointing at any variable in study model is five (a maximum of 5 arrows each point at USE, US and PV – see Figure 5.5 in Chapter 5). Therefore, a minimum sample size is calculated as 50. This, however, is only a rough guideline; more accurate calculations require considering the background of the model and data characteristics (Hair Jr et al. 2014).

Power analysis is also used as a guideline to indicate the minimum sample size for SEM (Cohen 2013). SEMs allow models to incorporate complex associations among latent variables and use of various types of data, so determining the appropriate sample size for SEM is challenging (Wolf et al. 2013). To aid this process a-priori sample size calculator for SEM is used (Soper 2020). Sample size is calculated on the basis of number of observed and latent variables, anticipated effect size, desired probability and statistical power levels (Cohen 2013; Westland 2010). A sample size of 288 is calculated with an effect size of 0.3, statistical power of 80 percent and a probability level of 0.05 using the above referred SEM sample size calculator. Further, sample size of comparable studies can be used to determine

sample size (Israel 1992). Sample size of similar studies like (Laumer, Maier & Weitzel 2017; Rana, Dwivedi, Williams & Lal 2015) was also examined and is found comparable to this study.

4.6.3 Instrument Development

Once the sampling strategy is finalised and sample size calculated, the next important consideration is to develop the survey instrument. It is important that survey instrument adequately measures the concept of interest (content validity) (Boateng et al. 2018). In research scenarios where existing scales can be used it is often recommended to use or adapt existing scales (Saunders, Lewis & Thornhill 2009). Following this advice existing validated instruments are used, however are adapted to the context to address research objectives of the study. The survey instrument was divided into four sections. The first section collected the demographic information of participants. The second captured the system characteristics dimension, whereas the third inquired about individual technology readiness characteristics of the participants. The last section contained questions pertaining to the impact of e-Gov services. At the end of the questionnaire, respondents were asked two open-ended questions about the challenges faced and impact of e-Gov services.

To capture the individual characteristics, scale developed by Parasuraman and Colby (2015) is adapted. The scale captures four individual dispositions of optimism, innovativeness, discomfort and insecurity on a 16-item scale. System characteristics are captured by using dimensions of information quality, system quality and service quality. A scale devised by Teo, Srivastava and Jiang (2008) is adapted to measure system characteristics. Impact of e-Gov services in terms of PV is measured using constructs of efficiency, effectiveness and improved democracy. This scale is adapted from Scott, M, DeLone and Golden (2016). In total the overall instrument contained 65 items.

All items are measured using a five-point Likert scale, where 1 = strongly disagree and 5 = strongly agree. The Likert scale is commonly used to collect opinion-based data (Saunders, Lewis & Thornhill 2009). Moreover, Likert scales ensure high internal consistency (Robson & McCartan 2016) and are widely used (Chohan & Hu 2020b; Rana, Dwivedi, Williams & Lal 2015; Wang, Y-S & Liao 2008). Due to these reasons, a Likert scale is found suitable to collect quantitative data. The wording of questions is also important to ensure validity of the responses (Saunders, Lewis & Thornhill 2009). Questions were simply worded, avoiding technical jargon for clarity. Positive wording was used for all constructs except for

discomfort and insecurity, which innately capture negative personality dispositions and were worded accordingly.

The survey instrument primarily used closed-ended questions as they are easy to administer and take less time to complete (Desai & Reimers 2019). However, closed-ended questions can cause bias by suggesting responses to participants (Reja et al. 2003), while as Creswell (2014) noted, open-ended questions can supplement the survey questionnaire. To curtail the issue of bias and to get a richer response, participants were given the option to respond to two open-ended questions regarding their opinions on e-Gov challenges and value created by e-Gov initiatives. This option was taken up by a significant majority of respondents.

4.6.4 Pilot Testing

Pilot testing is conducted before the main phase of data collection commences. Preliminary data examination of pilot data ensures that collected data answers the research questions (Saunders, Lewis & Thornhill 2009). A pilot study can help refine the survey instrument and indicate the likely reliability and validity of the data (Saunders, Lewis & Thornhill 2009). Before the pilot testing, it is important to establish content validity by having an expert opinion on the suitability and representativeness of the measurement instrument (Saunders, Lewis & Thornhill 2009). Feedback from three domain experts was obtained. Notably, the survey instrument was based on an existing instrument and only minor changes were required.

The next important consideration to proceed with the pilot testing is the number of samples for pilot testing. The sample size depends on research objectives and available resources, however a minimum sample size for a pilot study is ten cases (Saunders, Lewis & Thornhill 2009). A pilot study was conducted on a group of 12 participants who were asked to give their feedback on various aspects of the questionnaire like the time it took to complete, any questions which were not clear, any topic omissions not covered and any formatting issues (Saunders, Lewis & Thornhill 2009). In view of the feedback received from the participants, the questionnaire was slightly modified to improve the comprehension and layout of the survey.

4.7 QUAL Implementation Consideration

Research Question 2 seeks to examine *how governments can support adoption and creation of PV in an emerging economy such as Pakistan?* To address this research question two ROs are developed: first, to identify the key PV issues that help/hinder creation of public

value; and second, to identify enabling and constraining factors that influence citizens' adoption of e-Gov and creation of PV in Pakistan. As the research design for this study is convergent parallel mixed methods, both QUAN and QUAL strands of the study are implemented simultaneously.

Pertinently, RQ2 is exploratory in nature, therefore it employs a qualitative approach for this phase of the study. Data was collected using interviews. There are three types of interviews - structured, semi-structured or unstructured. In a structured interview only predetermined identical questions are asked to respondents. Structured interviews are also sometimes called an interviewer administered questionnaire. Contrarily, in semi-structured interviews key themes guide the course of the interview and the interviewer has the flexibility to inquire about ideas in more detail which are deemed important (Saunders, Lewis & Thornhill 2009). In unstructured interviews there are no predetermined questions. Interview is informal and it explores the general area of interest in depth. This study adopted a semi-structured approach as it gave a sense of direction to the interview and also allowed flexibility to elicit ideas that emerged during the interview (Gill et al. 2008).

4.7.1 Designing the Interview Schedule

The interview schedule was designed to address key e-Gov uptake and PV issues and to otherwise gain managerial insights into e-Gov implementation in Pakistan. Accordingly, participants were posed questions regarding e-Gov uptake, implementation challenges, and potential benefits and impacts of e-Gov services in terms of PV. Purposefully, initial questions included in the interview schedule were introductory in nature and then gradually more complex issues were discussed.

4.7.2 Interviewee Selection

The fundamental criteria in participant selection is their ability to provide key information and valuable insights into issues under investigation (Reybold, Lammert & Stribling 2013). This is also called purposive sampling, where participants are selected on purpose because they can provide rich and in-depth information to address the research objectives (Teddlie & Tashakkori 2009). Given this consideration, and the hierarchical nature of e-Gov implementation in Pakistan, participants at operational, managerial and executive levels in the public-sector departments concerned with e-Gov implementation were identified and deemed as essential. In Pakistan e-Gov implementation is primarily driven by the following three public sector agencies: the *Ministry of IT & Telecom*, which at a federal level is a key policy-making body; the *National IT Board (NITB)* that gives specialised technical guidance

to the government; and the *National Telecom Corporation* which is the implementing agency. Interview participants from each of these organisations were selected that allowed access to rich and sufficiently diverse insights concerning their experience with e-Gov implementation in Pakistan. In total, nine interviews were conducted, which were more than sufficient as meta themes can be extracted in as little as six interviews (Guest, Bunce & Johnson 2006). Further, nine interviews were also found sufficient to achieve saturation in relation to the objectives of the study.

4.7.3 Conduct of Interviews

Initially, face-to-face interviews were planned. However, COVID-19 travel restrictions forced online interviews to be used as a more prudent alternative. These were conducted via Zoom or telephone as per preference of the participants from September 2020 to December 2020. Before the commencement of interviews, informed consent was obtained as per ethics requirement. Consent was also obtained to record the interviews, where participants preferred not to be recorded notes were taken. Interviews were conducted in English or Urdu according to participants' preference. Subsequently, interviews were translated and transcribed for the thematic analysis discussed in Chapter 6.

4.8 Data Analysis

Insightful interpretation of data is incumbent upon an efficient data analysis which can only be achieved when data is systematically organised. As the study adopted a mixed methods design both quantitative and qualitative data were analysed separately.

4.8.1 Quantitative Data Analysis

Quantitative data is analysed in two stages. In the first stage initial data analysis is carried out using Statistical Package for Social Sciences (SPSS) version 26. First step of data analysis is data preparation which involves coding the data, screening for any incomplete and missing values and detecting any outliers (Bourque, Clark & Clark 1992). Descriptive statistics were calculated for the data, reliability and validity was ascertained before structural model analysis of PLS-SEM.

4.8.1.1 Reliability.

Reliability refers to the ability of an instrument to yield consistent findings (Robson & McCartan 2016). Cronbach's alpha is a statistical manifestation of reliability of an instrument and is widely used (Heale & Twycross 2015). To measure the reliability of the

research instrument, internal consistency of items will be calculated using Cronbach's alpha coefficient. Cronbach's alpha score of above 0.7 is considered acceptable (Creswell 2014).

4.8.1.2 Validity

Validity refers to accuracy in measuring a concept in a quantitative study (Heale & Twycross 2015). It is often recommended to validate the survey instruments via content and construct validity (Straub, D, Boudreau & Gefen 2004). The following three different types of validity were assessed.

4.8.1.3 Face Validity

Face validity is a subset of content validity and is referred to as the degree to which an instrument appears to measure the intended concept (Heale & Twycross 2015). A wide range of people can comment on the face validity of an instrument like field experts (Heale & Twycross 2015), target respondents (Hardesty & Bearden 2004), or in situations of time constraint feedback from family or friends should be obtained to check if the questionnaire makes sense at all (Saunders, Lewis & Thornhill 2009). The survey instrument was found to be face valid according to opinion of three domain experts. Minor revisions were however made to improve the comprehension and understanding of the questions.

4.8.1.4 Construct Validity

Construct validity can be measured in terms of convergent and discriminant validity (Straub, D, Boudreau & Gefen 2004). Convergent validity refers to the degree to which indicators representing a construct are consistent with each other while discriminant validity tests that theoretically unrelated items are in fact not related to each other (Straub, D, Boudreau & Gefen 2004; Teddlie & Tashakkori 2009). Both convergent and discriminant validity of the survey instrument were assessed.

4.8.1.5 Structured Equation Modelling

SEM is a multivariate analysis technique that allows a researcher to examine the relationships between multiple independent and dependent variables (Hair Jr et al. 2014), SEM consist of two models: one is a measurement model, and the other is a structural model. The measurement model links observable indicator variables with latent constructs, whereas in a structural model latent constructs are linked with each other (Hair Jr et al. 2014). SEM analysis is essentially a two-stage process: first, assessment of reliability and validity of the measurement model; and second, estimating and evaluating the structural relationships.

There are two approaches to apply the SEM technique. One, a Covariance-based CB-SEM or AMOS and second, a variance-based Partial Least Squares PLS-SEM (Amaro, Abrantes & Seabra 2015). The CB-SEM approach is suitable for theory confirmation, whereas PLS-SEM is appropriate not only for theory confirmation research but is also suitable for a prediction oriented approach (Hair Jr, Joe F et al. 2017). Each approach has different statistical assumptions and is suited to different contexts and applications. For this study, PLS-SEM is deemed as an appropriate technique to evaluate the proposed framework and confirm the research hypotheses, as it allows formative conceptualisation of indicators and is also meets research objectives of the study (Hair Jr et al. 2014). The detailed SEM process and rationale for choosing PLS-SEM over CB-SEM is provided in Chapter 5.

Studies in the domain of IS research are also examined for data analysis technique used. Nguyen, Nguyen and Cao (2015) conducted a detailed literature review on research approaches using the IS success model. According to their review, the most common data analysis techniques in IS success research are SEM (Bradley, Pridmore & Byrd 2006; Xinli 2015), regression analysis (Almutairi & Subramanian 2005) and factor analysis (Byrd et al. 2006; Chen, JV et al. 2015). Table 4.3 below lists the studies using different research methods and elaborates the different constructs of the IS success model used in the studies. It is evident that Structural Equation Modelling (SEM) is widely used in the IS domain. It is also suitable for complex predictive models and theory building (Barclay, Higgins & Thompson 1995; Chin 1998a) and so is deemed suitable technique for this study.

Table 4.3: Review of IS success studies and research methods used

Study	**System Quality**	**Info Quality**	**Service Quality**	**Use**	**User satisfaction**	**Individual Impact**	**Org Impact**	**Net Benefits**	**Quant analysis technique**
(Pitt, Watson & Kavan 1995)	X	X	X	X	X	X	X		Factor Analysis
(Gable, G, Sedera & Chan 2003)	X	X			X	X	X		Factor Analysis
(Bharati & Chaudhury 2004)	X	X							SEM
(Garrity et al. 2005)	X				X	X	X		SEM

(Petter & McLean 2009)	X	X	X	X	X			X	-
(Floropoulos et al. 2010)	X	X	X		X				Regression analysis
(Urbach, Smolnik & Riempp	X	X	X	X	X	X	X		SEM
(Gao & Bai 2014)	X	X			X				SEM
(Ghobakhloo, Hong & Standing	X	X	X	X	X			X	SEM
(Lai 2016)	X	X			X			X	SEM
(Ghobakhloo & Tang 2015)	X	X	X	X	X			X	SEM
(Mohammadi 2015)	X	X	X	X	X				SEM
(Rana, Dwivedi, Williams & Lal 2015)	X	X			X				Regression Analysis
(Xinli 2015)	X	X		X	X			X	Regression Analysis
(Forsgren et al. 2016)	X	X			X				SEM
(Michel & Cocula 2017)	X	X	X		X				SEM
(Laumer, Maier & Weitzel 2017)	X		X		X			X	SEM

4.8.2 Qualitative Data Analysis

Qualitative data is collected through interviews which is one of the most common methods of data collection in social science research (Ryan, Coughlan & Cronin 2009). Semi-structured interviews are conducted with e-Gov practitioners entrusted with the responsibility of formulation and execution of e-Gov initiatives in Pakistan. Thematic

analysis was conducted following a six-step process suggested by Braun and Clarke (2006): i) data familiarization; ii) coding; iii) generating themes; iv) reviewing themes; v) defining and naming themes; and vi) write up.

To facilitate QUAL analysis NVivo is used, which is a widely used software for qualitative research (Dollah, Abduh & Rosmaladewi 2017). Qualitative research requires interpreting meanings from people's personal observations and accounts (Lynch 1990). NVivo facilitates this interpretation process as the researcher is able to sort data and can extract themes easily (Bazeley & Jackson 2013). Qualitative data was coded in the software program and then organised to create categories. Subsequently the data was analysed using thematic analysis which involved sorting, organising and extracting themes (Nowell et al. 2017). Finally, in the last stage a report was written that reflected the respondents' viewpoints about the issue under investigation.

4.9 Ethical Considerations

Adhering to principles of ethics is of fundamental importance in any research study. This study strictly complied with the ethical guidelines established not only by the Victoria University, but also of the self. Ethical approval from Victoria University Human Research Ethics Committee was obtained prior to commencement of data collection. Participants were given an information letter that described study aims and objectives and any potential risks of participating in the study. An informed consent was obtained from the respondents who were informed about the voluntary nature of participation in the study. Further, participants were informed of their right to withdraw from the study at any point. Finally, the participants were also informed that confidentiality of all the research data will be maintained, and their privacy and anonymity would be protected. No interview participants are identified by their names. In doing so all ethics requirements of Victoria University are fulfilled and an ethics approval obtained prior to commencement of any data collection. A copy of the approved ethics application is attached as Appendix 1.

4.10 Summary

This chapter sets out the overall research and methodological processes to address the research objectives. First, different philosophical worldviews and approaches to research are introduced and a pragmatist paradigm is justified for this study. The rationale for using convergent parallel mixed methods approach is provided since this approach allows to meet research objectives by addressing confirmatory as well as exploratory questions of the study

(Teddlie & Tashakkori 2009). As the mixed methods approach uses both QUAN and QUAL data, detailed implementation considerations for both strands are provided. In the quantitative strand detailed steps from sampling strategy to data collection and analysis are explained. Initial data analysis will be conducted in SPSS, whereas detailed quantitative analysis and hypothesis testing will be executed using SEM. The qualitative data is collected using interviews and will be analysed using thematic analysis.

The next chapter details how this methodology is put into action and presents findings of the QUAN phase, while Chapter 6 presents findings and discussions of the QUAL phase of the study.

CHAPTER 5: QUANTITATIVE FINDINGS AND DISCUSSION

5.1 Introduction

The previous chapter outlined the research methods used in this study. This chapter presents the findings and discussion based on the QUANT phase of the study. As such, this chapter addresses RQ 1. To recall, RQ 1 is: *what is the interplay between individual and system characteristics on adoption of e-Gov services in an emerging economy like Pakistan?* The following two ROs associated with RQ1 are as follows:

> **RO 1:** Examine the interplay between individual and system characteristics on adoption of e-Gov services (*in terms of use and user satisfaction*).
>
> **RO 2:** Examine the success of e-Gov services from a citizen perceptions point of view measured in terms of public value dimensions.

Under each research objective, several hypothesised relationships developed in Chapter 3 were tested. Initial quantitative data analysis was carried out in SPSS for data examination and descriptive statistics. Later, Structural Equation Modelling (SEM) tested the hypothesised relationships between different variables in SmartPLS (Salkind 2010).

In this chapter, the first section details the steps taken to clean the data and presents the results of preliminary data examination. Subsequently, demographic profiles of the participants is presented with correlations discussed and descriptive statistics outlined. As the study has used the PLS-based SEM approach for QUANT analysis, the rationale for using this approach is stated. Afterwards, both measurement and structural model of SEM analysis is discussed, and results of hypothesis testing are presented. The chapter concludes with a general discussion of the QUANT findings concerning the effect of individual and system characteristics on e-Gov use and user satisfaction.

5.2 Overview of the Survey Data

5.2.1 Data Collection Process and Sample Size

The study used a self-administered online questionnaire for data collection. The survey instrument was designed and distributed using the online Qualtrics platform, and it remained open between September 2020 and January 2021. In total, 381 responses were received and of it, 61 responses were partially completed and so were deleted for the purposes of QUANT

data analysis. A further 29 responses were deleted being outliers or had suspicious response patterns effectively leaving 291 responses for QUANT analysis. The data screening process is discussed in detail in section 5.3.

5.2.2 Demographic Profile

The demographic profiles of the survey participants are presented in Table 5.1. According to descriptive statistics, 80 percent of the respondents were males, while almost 20 percent of the participants were females. This relatively lower participation by the latter is worthy of future study. The trend is consistent with an earlier study by Antonio and Tuffley (2014) who suggested women in developing countries are less active as users of online internet services compared to men. Influential factors noted included reduced educational opportunities and a greater likelihood of being unemployed. More than half of the participants (54.6 percent) were between the ages of 25-39 years while an overwhelming majority had a Bachelor or above qualification. Only 5.8 percent of participants indicated a secondary school qualification. Less participation by this segment of population is expected as such people are not likely to participate in an online survey due to lack of digital literacy or access to online technology (Pew 2019).

Table 5.1: Demographic profiles of respondents

Demographics	Frequency (N=291)	Percentage
Gender		
Male	233	80.1%
Female	58	19.9%
Age		
18-24 years	48	16.5%
25-39 years	159	54.6%
40-59 years	69	23.7%
60 years and above	15	5.2%
Education		
Secondary	17	5.8%
Bachelor	100	34.4%
Master	155	53.3%
Doctorate	19	6.5%

Table 5.2 presents the socio-economic status (SES) of the participants. To capture this dimension the study employed the MacArthur scale of subjective socio-economic status (Adler & Stewart 2007). Participants were presented with a pictorial form of a "social ladder" consisting of ten steps and asked to position themselves on one of the steps of the ladder where they think they are relative to other people in Pakistan, step one representing

the lowest and ten being the highest socio-economic status. Most respondents were placed between middle to upper-middle steps of ten-point scale. This band is indicative of prevailing divides: at the lower end arguably determined by access to and cost of infrastructure, while at the highest end it is suggestive of a community with less digital skills and potentially differing user need. Logically, these groups are useful future targets for deeper research across gender, language, and education boundaries.

Table 5.2: Subjective Socio-Economic Ladder (Status)

SES	Frequency (N=291)	Percent
10 (highest)	2	0.7%
9	09	3.1%
8	44	15.1%
7	73	25.1%
6	76	26.1%
5	62	21.3%
4	12	4.1%
3	7	2.4%
2	4	1.4%
1 (lowest)	2	0.7%

5.2.3 E-Gov Usage Frequency

Respondents were asked about how frequently they used e-Gov applications. 82.5 percent of the users indicated they have used an e-Gov application within last six months. Among these, around 28 percent were regular users whereas 36.8 percent had used an e-Gov application within the last three months. Almost 18 percent of respondents indicated that they have used an e-Gov service more than six months ago. A detailed breakdown of usage frequency is tabulated in Table 5.3.

Table 5.3: E-Gov Usage Frequency

Usage	Frequency	Percentage
Regular User	81	27.8%
In the last three months	112	38.5%
More than 6 months	52	17.9%
Never used	46	15.8%

Although 15.8 percent of respondents mentioned that they have not used an e-Gov service before, in the subsequent questions asking for types of e-Gov service used they either ticked one of the options from the available choices or explicitly noted another e-Gov application

used in the provided text box. This implies that what the term e-Gov services means may have been misunderstood by some respondents.

5.2.4 E-Gov Applications Used

Survey respondents were also asked about the type of e-Gov applications they have used. Table 5.4 provides the breakdown of different types of e-Gov services used by respondents. More than half of the respondents indicated they have used the Pakistan Citizen Portal which is a government complaint registration system. Around 36 percent of respondents used the COVID-19 PK app to access COVID-19-related information, whereas 29 percent of the respondents used it for online tax filing. The detailed breakdown of the e-Gov application use is provided in Table 5.4. Pertinently, as one person may use multiple e-Gov applications, respondents were given the choice to select more than one option, therefore the percentages will not amount to one hundred percent as indicated below.

Table 5.4: Type of e-Gov application used

Application Used	Frequency (N)	Percentage
Pakistan Citizen Portal	162	51%
COVID-19 PK	114	36%
FBR Tax Aasan	93	29%
Web-Based e-Gov services	101	32%
Any other	45	14%
Never Used	54	17%

5.3 Data Screening and Preparation for SEM Analysis

5.3.1 Missing Data

A total of 381 responses were received and of this total, 61 were partially completed or had missing values. As an online survey was employed, respondents were required to complete the preceding section before moving on to next questions. The survey was relatively lengthy and analysis of missing values showed that the latter part of the survey had the most missing values. Missing values accounted for 16 percent of the total responses; this conforms with the observation that 15 to 20 percent of missing values are commonly noted in research studies (Dong & Peng 2013). When the missing values exceed 15 percent, Hair Jr et al. (2014) recommend removing the observation from the data. Accordingly, all missing values were deleted from the data, effectively leaving 320 survey responses for further screening.

Before proceeding on to detailed data analysis, the data was tested for straight lined responses, detection of outliers and normality of data.

5.3.2 Straight Lining

As part of data screening, the survey data was examined for any suspicious response patterns and this is often referred to as straight lining, which occurs when a respondent marks the same choice for all or a large number of questions (Hair Jr et al. 2014). Such a response should be removed from data being unreliable and suspicious. For example, if in a five-point Likert scale a respondent selects the middle point, i.e. option three for all of the responses, a respondent would have straight lined all answers and should be deleted from data (Hair Jr et al. 2014). Nine responses were discovered as straight liners and deleted from data leaving 311 survey responses for further screening.

5.3.3 Outliers

An outlier is a case that has an extreme response to one or all of the questions in a survey data (Hair Jr et al. 2014). Outliers can either be univariate or multivariate. A univariate outlier has an extreme response to a single variable, whereas a multivariate outlier has an extreme response to a combination of scores of two or more variables (Tabachnick, Fidell & Ullman 2007). Univariate outliers can be detected in SPSS using standardised z-scores or through graphical examination of histograms, boxplots and normal probability plots, whereas multivariate outlier can examined using Mahalanobis Distance (MD) (Tabachnick, Fidell & Ullman 2007), which represents the distance of a case from the mean of the remaining cases in a multidimensional space. As a conservative estimate for a case to be deemed an outlier, the p-value for a chi-square distribution for a MD should be $< .001$ (Tabachnick, Fidell & Ullman 2007). Viewing the above-mentioned criteria, a total of 20 responses were detected as outliers and so eliminated from further data processing effectively leaving 291 responses for QUANT analysis.

5.3.4 Data Distribution and Normality

This study adopted the PLS approach for Structural Equation Modelling (SEM). PLS SEM is a non-parametric method that does not require normal data distribution. It is still important to examine data distribution as extremely non-normal data can inflate standard errors that can be problematic (Hair Jr et al. 2014). Conversely, normality refers to a symmetric distribution, where sample data points can be plotted as a bell-shaped curve (Saunders,

Lewis & Thornhill 2009). Normality can be assessed by examining skewness and kurtosis of the data (Hair Jr et al. 2014). Skewness refers to the symmetry of the distribution, while kurtosis illustrates how flat or peaked a distribution is as compared to a normal distribution (Creswell 2014). Skewness and kurtosis values close to zero are considered as normal, however this is unlikely to be achieved in the real world. A skewness value greater than 3 and kurtosis greater than 10 indicates a problem (Kline, RB 2015). Further, according to Tabachnick, Fidell and Ullman (2007), when the sample size is greater than 200 the effect of deviation from skewness and kurtosis diminishes on data analysis. All the skewness and kurtosis values for the collected data were found within the recommended range. Further, as the sample size is greater than 200 and the study employed a non-parametric PLS based approach for SEM, data distribution was found appropriate for further SEM analysis.

5.3.5 Descriptive Statistics

Data for all the items was collected using a five-point Likert scale. A score of 5 indicated strongly agree, whereas a score of 1 indicated strongly disagree. All items were positively worded except for the constructs of discomfort and insecurity which were innately designed to capture constraining TR behaviour and were accordingly worded. According to descriptive statistics most of the items had a mean value of above neutral point 3, indicating participants generally exhibited a positive response to all survey items. Summary statistics for all survey items are tabulated in Table 5.5.

Table 5.5: **Descriptive statistics**

Construct		Minimum	Maximum	Mean	Std. Deviation
Information Quality	IQ_1	1	5	3.79	0.856
	IQ_2	1	5	3.71	0.864
	IQ_3	1	5	3.73	0.867
	IQ_4	1	5	3.65	0.873
	IQ_5	1	5	3.58	0.913
	IQ_6	1	5	3.71	0.884
System Quality	SQ_1	1	5	3.62	0.989
	SQ_2	1	5	3.57	1.003
	SQ_3	1	5	3.54	0.946
Service Quality	SVQ_1	1	5	3.21	1.066
	SVQ_2	1	5	3.28	1.060
	SVQ_3	1	5	3.33	0.996
	SVQ_4	1	5	3.48	0.982
	SVQ_5	1	5	3.56	0.974
User Satisfaction	US_1	1	5	3.42	1.005
	US_2	1	5	3.38	1.035

	US_3	1	5	3.53	0.976
Use	USE_1	1	5	3.14	1.072
	USE_2	1	5	3.62	0.919
	USE_3	1	5	3.03	1.081
Optimism	OPT_1	1	5	4.23	0.820
	OPT_2	1	5	4.14	0.792
	OPT_3	1	5	4.16	0.794
	OPT_4	1	5	4.13	0.837
Innovativeness	INV_1	1	5	3.63	0.973
	INV_2	1	5	3.34	1.047
	INV_3	1	5	3.82	0.912
	INV_4	1	5	3.73	0.899
Discomfort	DISCFT_1	1	5	2.77	0.991
	DISCFT_2	1	5	2.83	0.959
	DISCFT_3	1	5	2.66	0.963
	DISCFT_4	1	5	3.25	1.089
Insecurity	INSEC_1	1	5	3.41	0.963
	INSEC_2	1	5	3.68	1.029
	INSEC_3	1	5	3.18	1.094
	INSEC_4	1	5	3.89	0.817
Efficiency	EFCY_1	1	5	3.82	0.849
	EFCY_2	1	5	3.97	0.734
	EFCY_3	1	5	3.94	0.766
	EFCY_4	1	5	4.11	0.755
	EFCY_5	1	5	4.04	0.773
	EFCY_6	1	5	3.82	0.909
	EFCY_7	1	5	3.95	0.792
	EFCY_8	1	5	3.75	0.877
	EFCY_9	1	5	3.72	0.879
	EFCY_10	1	5	3.78	0.867
Effectiveness	EFCTV_1	1	5	4.06	0.747
	EFCTV_2	1	5	4.07	0.720
	EFCTV_3	1	5	3.77	0.835
	EFCTV_4	1	5	3.47	0.976
	EFCTV_5	1	5	3.79	0.773
	EFCTV_6	1	5	3.93	0.709
	EFCTV_7	1	5	3.83	0.804
	EFCTV_8	1	5	3.70	0.873
Improved Democracy	IMPDCY_1	1	5	4.08	0.780
	IMPDCY_2	1	5	3.93	0.791
	IMPDCY_3	1	5	3.81	0.861
	IMPDCY_4	1	5	3.82	0.841
	IMPDCY_5	1	5	3.85	0.749
	IMPDCY_6	1	5	3.80	0.803
	IMPDCY_7	1	5	3.75	0.831
	IMPDCY_8	1	5	3.73	0.892

IMPDCY_9	1	5	3.61	0.992
IMPDCY_10	1	5	3.41	0.984
IMPDCY_11	1	5	3.48	1.011

5.4 Structural Equation Modeling (SEM)

SEM is a multivariate analysis technique (Hair Jr et al. 2014) and is extensively used in management sciences (Hair, Joe F, Ringle & Sarstedt 2011). SEM is also known as a second-generation statistical tool that allows a researcher to examine the relationships between multiple variables and account for measurement errors when measuring latent constructs (Šiška 2018). Contrary to first generation statistical methods, SEM includes approaches such as regression and factor analysis (Hair Jr et al. 2014). SEM can be seen as combination of different statistical techniques that include multiple regression, path analysis and factor analysis (Salkind 2010). Using SEM, a researcher can examine whether a proposed theoretical model exhibited by relationships between different exogenous and endogenous variables fits the collected data (Salkind 2010).

5.4.1 Types of Models in SEM

SEM consists of two elements or models. One is measurement model, and the other is a structural model. The measurement model links observable indicator variables with latent constructs (variables that are not measured directly), whereas in a structural model latent constructs are linked with each other (Hair Jr et al. 2014). SEM has the ability to not only assess reliability and validity of constructs (the measurement model), but also enables a researcher to examine theoretical structural relationships among different latent constructs (Hair, Joe F et al. 2012; Hair Jr, Joe F et al. 2017). Therefore, SEM analysis is essentially a two-stage analysis: first, assessment of reliability and validity of the measurement model; and second, estimating and evaluating the structural relationships.

5.4.2 SEM Approaches

There are two approaches to apply the SEM technique. The first is Covariance-based CB-SEM or AMOS, and the second is a variance-based Partial Least Squares PLS-SEM (Amaro, Abrantes & Seabra 2015). The CB-SEM approach is suitable for theory confirmation, whereas PLS-SEM is deemed appropriate not only for theory confirmation research but is also suitable for prediction oriented approach (Hair Jr, Joe F et al. 2017). Each approach has different statistical assumptions and is suited to different contexts and applications. This study adopted a PLS-based SEM approach. Table 5.6 lists the guidelines

for using a PLS or CB-SEM approach. The following section provides the rationale for PLS-SEM. An earlier SEM analysis using AMOS was not included. Rather, PLS was preferred, principally because it allowed a formative conceptualisation of indicators.

Table 5.6: Guidelines for selecting the SEM approach (Hair Jr, Joe F et al. 2017)

Type of Analysis	PLS-SEM	CB-SEM
Objective of the study is prediction	X	
Objective of the study is exploratory or theory development	X	
Objective of the study is explanation		X
Reflective measurement model is specified in the study		X
Formative measurement model is specified in the study	X	
Sample size is small	X	
Sample size is large		X
Normal data distribution		X
Normal distribution not assumed	X	

5.4.3 Rationale for PLS-SEM Approach

This study used the PLS-SEM approach for the quantitative data analysis. Hair Jr et al. (2014) provide the following rules of thumb to choose PLS-SEM approach. First, when the goal is to predict or identify key driver constructs among many antecedent factors; the second is when the researcher is dealing with complex structural models consisting of many indicators and constructs; and third, when the sample size is small or is not normally distributed. The structural model is essentially complex as it contains multiple dependent-independent relationships among ten latent constructs. Further, one of the objectives of the quantitative analysis was to identify key drivers of e-Gov services' adoption in Pakistan. These conditions align with the rule of thumb to use PLS-SEM as noted by Hair Jr et al. (2014). Therefore, a PLS-based approach is deemed suitable for this study.

A second justification for using PLS is that it is extensively employed in IS and business research (Roldán & Sánchez-Franco 2012; Sarstedt et al. 2019). E-Gov is a multidisciplinary field that also identifies with IS and business research. Given the evidence of successful use of PLS-SEM in these domains, this study has confidently employed a PLS-based SEM approach. Third, PLS is a useful technique when a study builds upon existing research. As suggested by Chin (2010), it is appropriate methodologically when a researcher

"*builds on a prior model by developing both new measures and structural paths*". This study builds on the Delone and McLean IS success model and integrates with TR model, and so PLS is deemed an appropriate technique for quantitative analysis.

Fourth, PLS-SEM is also recommended when the study model specifies formative measurements (Hair Jr, Joe F et al. 2017). The study specifies Technology Readiness (TR) dimensions of motivators and inhibitors as higher-order constructs with formative measurement. Besides, public value or PV is also specified as a higher-order construct with formative measurement. Viewing these model complexities and formative specifications of measurement model, PLS-SEM is an appropriate modelling technique to evaluate the hypothesised relationships.

Finally, both SEM approaches are considered complementary, and the researcher is advised to consider the approach that is most appropriate for achieving the research objectives (Chin 2010; Hair Jr et al. 2014; Sarstedt et al. 2016). In fact many simulation studies note a low level of difference in results among both approaches (Hair, Joe F, Ringle & Sarstedt 2011). In view of the above discussion and objectives of the research PLS based SEM approach is found suitable for this study.

5.5 Data Analysis

To estimate the hypothesised relationships, a path model was drawn in SmartPLS version 3.3.3. Path weighting scheme was used to set up a PLS algorithm in the software (Henseler 2010). Further algorithm configuration included setting up the maximum number of iterations as 300 (Hair, Joe F et al. 2012).

A two-step approach was followed for data analysis. At first, the measurement model was analysed while in the second stage a structural model was examined. The measurement model is assessed by examining the constructs' reliability and validity. If the measurement model is found acceptable, the structural model is then examined by evaluating size and significance of path coefficients, coefficient of determination (R^2) and predictive relevance (Q^2) values (Hair Jr et al. 2014). A detailed description of the relevant processes in evaluating measurement and structural model are tabulated in Table 5.7.

Table 5.7: **Evaluating SmartPLS SEM Results (Hair Jr et al. 2014)**

Measurement Model	**Structural Model**
Internal Consistency (Composite Reliability)	Coefficient of determination (R^2)

Indicator Reliability	Predictive Relevance (Q^2)
Convergent Validity (AVE)	Size and significance of path coefficients
Discriminant Validity	f^2 effect sizes

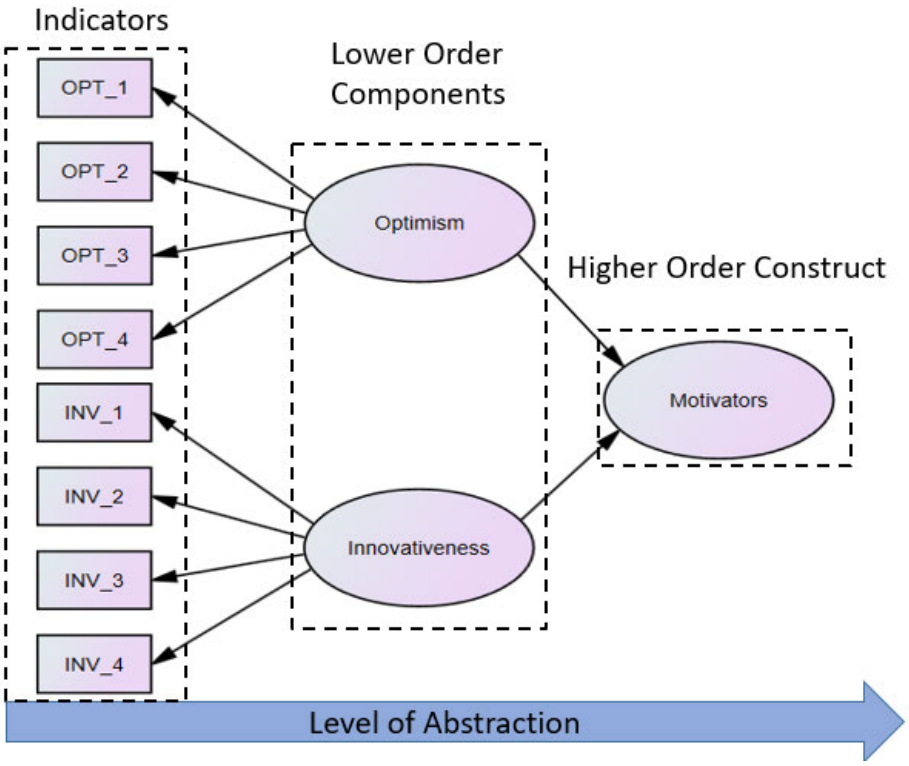
The study used Higher-Order Constructs (HOC) to specify three constructs in the model: i) motivators, ii) inhibitors, and iii) PV. The measurement model of the HOC is required to be evaluated in the same manner as any other PLS-SEM model is evaluated (Chin 2010; Sarstedt et al. 2019). The following section reports the details about the conceptualisation of the HOC used in the study, followed by the approach adopted to validate the measurement model of HOC.

5.6 Higher-Order Constructs (HOC)

5.6.1 Conceptualisation of HOC

Higher-order Constructs (HOC) are also referred to as Hierarchical Component Model (HCMs) in the context of PLS modelling. HOCs allow the researcher flexibility to conceptualise a construct at a higher level of abstraction (Sarstedt et al. 2019). This is advantageous as it reduces the relationships in the path model and helps achieve model parsimony (Johnson, Rosen & Chang 2011). Further, it also helps reduce multicollinearity issues among formative indicators (Sarstedt et al. 2019). HOC can be formed by summarising the relationships between multiple independent and a dependent variable into a new construct (HOC). This new construct encompasses the dimensions of the now lower-order components. Therefore, each HOC is composed of lower-order components which entails more concrete sub-dimensions of the construct (Sarstedt et al. 2019). Figure 5.1 illustrates the conceptualisation of one of the higher-order constructs (*Motivator* in the study (Fig 5.1 is drawn using AMOS – see section 5.4.3). The image is added for conceptual clarity of the HOC and does not include error terms.

Figure 5.1: Conceptualisation of Higher-Order Construct – Motivator



As shown in Figure 5.1 above, two sub-dimensions of Technology Readiness (TR), optimism and innovativeness are summarised into a new higher-order construct - motivator. Likewise, discomfort and insecurity can be summarised into a new HOC – inhibitors, albeit that the lower-order components for this construct are not presented visually. The details of all the HOC and their lower-order sub-dimensions are noted in Table 5.8.

Table 5.8: Higher-order construct conceptualisation

Higher-Order Construct (HOC)	Respective lower-order components
Motivators	Optimism and Innovativeness
Inhibitors	Discomfort and Insecurity
Public Value	Efficiency, Effectiveness, and Improved Democracy

5.6.2 Rationale for Higher-order Operationalisation

A key consideration for operationalisation of HOC is that the relevant theory should support the number of sub-dimensions included in a higher-order construct and their respective relationships (Becker, Klein & Wetzels 2012). The study model used two Technology Readiness (TR) dimensions of motivators and inhibitors and Public Value (PV) as higher-order constructs, as this conceptualisation is supported by existing theory. As discussed in previous chapters, TR is a combination of mental motivators and inhibitors (Parasuraman

& Colby 2015). TR theory suggest that motivators consist of two sub-dimensions of optimism and innovativeness, whereas sub-dimensions of inhibitors constitute discomfort and insecurity (Parasuraman & Colby 2015). Based on these theoretical underpinnings, motivators are conceptualised as a higher-order construct with optimism and innovativeness as respective lower-order components. Similarly, inhibitors are conceptualised as a higher-order construct with discomfort and insecurity as its respective lower-order components. Likewise, theory on e-Gov Public Value (PV) supports the existence of three separate dimensions of PV: efficiency, effectiveness and improved democracy (Scott, M, DeLone & Golden 2016). Based on these theoretical foundations, PV is also operationalised as a higher-order construct with efficiency, effectiveness, and improved democracy as its respective lower-order components.

Once the need for higher-order model specification is established, the next consideration in operationalisation of HOC is to specify the relationship between higher-order construct and its respective lower-order components (Sarstedt et al. 2019). Two decisions are especially important in this regard: i) Measurement model specification of lower-order components; and ii) the relationship between lower-order components and the respective HOC (Sarstedt et al. 2019). In this regard, reflective-reflective and reflective-formative approaches are predominantly used in PLS studies (Ringle, Sarstedt & Straub 2012). According to Coltman et al. (2008), both theoretical and empirical considerations must be taken into account before deciding a measurement model as either reflective or formative. In a reflective model, direction of the arrows is from the construct to the indicators, whereas in a formative measurement model direction of the arrows is from the indicators to the construct (Hair Jr et al. 2014). For example, in Figure 5.1 both lower-order components of optimism and innovativeness are reflectively specified as direction of the arrow is from construct to the indicator. However, the HOC of motivators is formatively specified as the direction of the arrow is towards the construct.

Theoretically, all items of a reflective construct share a common theme and adding or deleting single items from the construct will not change the construct itself; the converse is also true for formative constructs (Sarstedt et al. 2016). Empirically, as reflective items support the same construct, all reflective indicators have positive and high correlations among them (Coltman et al. 2008). A formative construct, conversely, is formed by the linear combinations of the model indicators and can have any pattern of correlations between the indicators (Coltman et al. 2008; Sarstedt et al. 2016). Noting these conceptual distinctness between reflective and formative indicators, constructs often do not follow

reflective or formative measurement logic (Baxter 2009). Rather, researchers have the freedom to conceptualise a construct based on their preferred definition (Sarstedt et al. 2016).

This study specifies all three higher-order constructs, namely *motivators*, *inhibitors*, and *public value* as reflective-formative. In a reflective-formative model the lower-order components are measured reflectively; these lower-order components may not share a common cause, but collectively they form a concept that fully explains the higher-order construct (Becker, Klein & Wetzels 2012). As depicted in Figure 5.1, optimism and innovativeness are two facets of TR that together form a more abstract dimension of motivator (Parasuraman & Colby 2015). Similarly, discomfort and insecurity are two other facets of TR, that together form a more abstract TR dimension of inhibitor (Parasuraman & Colby 2015). Viewing these considerations, motivators and inhibitors are formatively specified as second-order HOC. At this stage, there was an option to consider specifying TR as a third-order HOC, with motivators and inhibitors as lower-order components, but a second-order conceptualisation was found appropriate by Blut and Wang (2020). In fact, the authors found evidence that TR is best conceptualised as a two-dimensional concept, distinguishing between motivators and inhibitors. In line with these considerations, TR is conceptualised as a second-order reflective construct measured in terms of motivators and inhibitors.

On a similar line of reasoning as outlined above, *efficiency*, *effectiveness* and *improved democracy* are identified as lower-order reflective components that collectively form a higher-order construct-PV (Becker, Klein & Wetzels 2012). PV is arguably created in a staged manner by first realising operational efficiencies, then by functional effectiveness and finally the highest order public value of improved public participation (Le Blanc 2020). This example is a manifestation of the formative nature of the PV construct, or else, if PV was conceptualised as a reflective construct it would mean that a user who only realised efficiency benefits would be expected to achieve a high score on the other two PV dimensions (effectiveness and improved democracy) as well, as in a reflective construct all indicators share a common theme. Understandably, this is not the case in terms of achieving the higher order benefits of public value in e-Gov adoption and uptake.

Further, when statistically tested all three lower-order components of efficiency, effectiveness and improved democracy had high correlations among them (0.81 between efficiency and effectiveness, 0.81 between effectiveness and improved democracy and 0.73

between efficiency and improved democracy). This also suggests the presence of a higher-order construct that may be able to explain high correlations among first-order latent factors (Brown 2015). Accordingly, based on theoretical and empirical underpinnings, PV is conceptualised as a second-order formative construct. Apart from these theoretical and empirical considerations, a second-order model is especially advantageous over a first-order model as it allows to build a more parsimonious model with simpler and fewer relationships (Chen, FF, Sousa & West 2005).

5.6.3 Specifying the HOC

Two approaches are commonly used to specify a HOC: repeated indicators approach and the disjoint two-stage approach (Hair Jr, Joseph F et al. 2017). In the repeated indicator approach all indicators of the lower-order construct are repeated in the HOC and resultantly variance in HOC will be fully explained by the lower-order components. This will result in an R^2 value of one. It is problematic since any antecedent variable in the model which is not part of HOC will not be able to explain any variance in HOC, as that would have been already fully explained (Sarstedt et al. 2019). To solve this problem this study adopted a disjoint two-stage approach. In a first stage of this two-stage approach, there are no higher-order constructs, as all lower-order components in a path model are directly linked to other constructs. After specifying the model without HOC, the Latent Variable Scores (LVS) of lower-order constructs were obtained. In the second stage, the LVS obtained in the first stage serve as indicators to form higher-order constructs (Sarstedt et al. 2019).

5.6.4 Validating the HOC

The higher-order models should be evaluated in the same manner as any other PLS-SEM model is evaluated (Chin 2010; Sarstedt et al. 2019). In addition to validating the measurement model of the lower-order components, the complete higher-order model including lower-order components should also be evaluated (Sarstedt et al. 2019). This study has adopted a disjoint two-stage approach due to the reasons noted above. The following process is adopted to validate the measurement model of HOC.

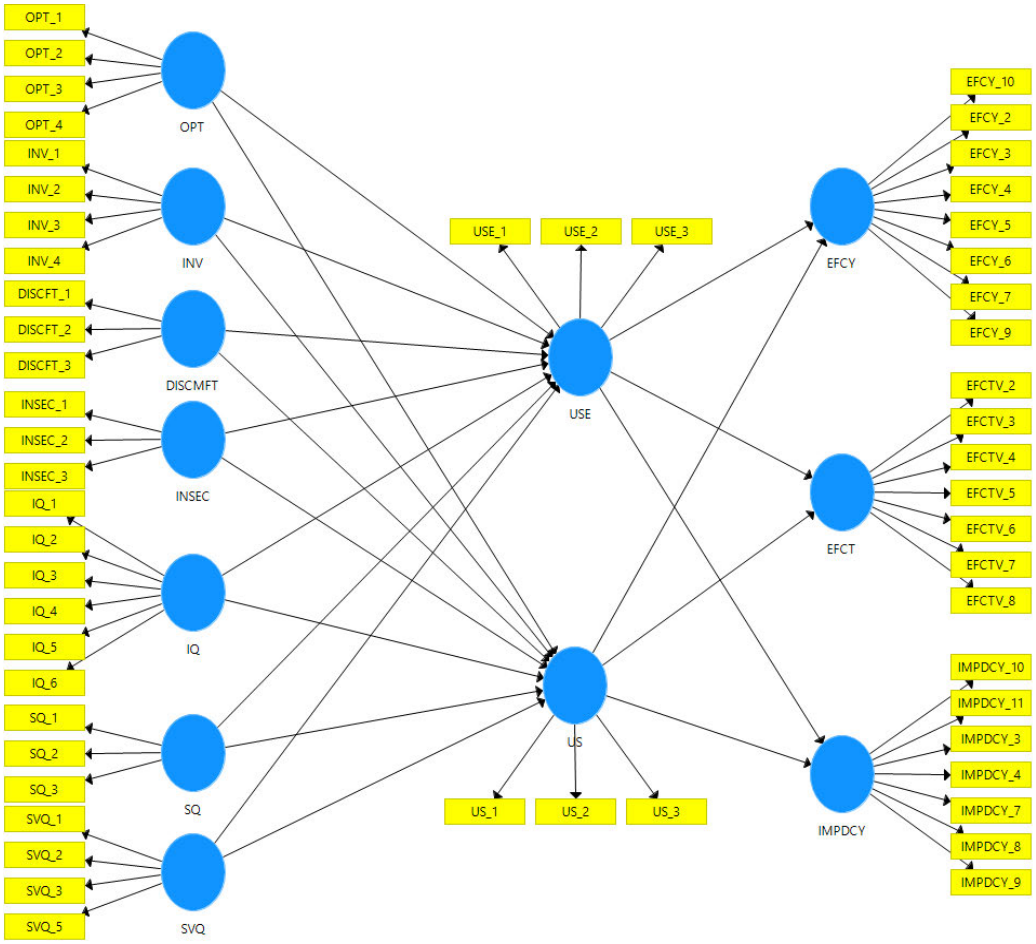
> Stage-1: In stage one, the measurement model for the lower-order components is assessed and estimated by drawing direct relationships between the independent and dependent variable; in other words, without including the higher-order construct in the model (Sarstedt et al. 2019).

Stage-2: Latent Variable Scores (LVS) are extracted and the higher-order measurement model is evaluated by establishing convergent validity, examining VIF and significance of outer weights (Hair Jr et al. 2014).

5.7 Stage-1: Measurement Model Assessment

The SEM path model with higher-order constructs is estimated using disjoint two-stage approach due to the reasons noted in section 5.6.3. In the first stage of this two-staged approach, the model is estimated using only lower-order components of the HOC (Sarstedt et al. 2019). That is the higher-order construct is deleted from the model and all relationships are drawn directly between the lower-order components and other constructs in the model to which HOC is theoretically related to-see the SEM path model in Figure 5.2. It is observed that there is no higher-order construct (motivators, inhibitors, or the PV) in the path model and relationships are directly drawn between the lower-order components and other related constructs in the model. This measurement model is assessed for internal consistency, indicator reliability, convergent validity and discriminant validity (Hair Jr et al. 2014).

Figure 5.2: Measurement Model of lower-order constructs



The measurement model in Figure 5.2 was tested for convergent and discriminant validity (Hair, JFJ et al. 2014). As part of measurement model evaluation, three items were deleted due to low factor loadings, one item was deleted during reliability analysis phase and another six items were deleted to achieve discriminant validity. According to Hair Jr, Babin and Krey (2017) up to 20 percent of the indicators can be eliminated to achieve model fitness. The total number of items eliminated in this study to achieve sufficient reliability and validity are well within this threshold. Detailed results for measurement model evaluation are presented in following sections.

5.7.1 Reliability Analysis

Reliability refers to the internal consistency of the items and can be assessed using Cronbach's alpha co-efficient (Hair, JFJ et al. 2014). Cronbach's alpha is calculated using internal co-relations among indicators. Cronbach's alpha score of above 0.7 is acceptable, and for psychological constructs score even below 0.7 can be expected considering the diversity of the constructs being examined (Kline, P 2000). Cronbach's alpha score for all items was above 0.7, however for four items of insecurity scale the alpha score was 0.648. Item number four of the construct measuring insecurity (INSEC_4) was deleted which improved the alpha score to 0.680.

As such, Cronbach's alpha is a conservative estimate of internal consistency because it is sensitive to the number of items in the measurement instrument (Hair Jr et al. 2014). Composite Reliability (CR) is regarded as a better measure of internal consistency and it takes into account outer loadings of indicators (Hair Jr et al. 2014). CR values between 0.6 and 0.7 are considered as acceptable, whereas CR values above 0.7 are considered as satisfactory (Hair Jr et al. 2014). All CR statistics for measurement items are within acceptable range. Detailed reliability scores for all items are depicted in Table 5.9.

Table 5.9: Reliability Statistics

	Cronbach's Alpha	Composite Reliability
DISCMFT	0.786	0.875
INSEC	0.680	0.824
EFCT	0.890	0.915
EFCY	0.912	0.929
IMPDCY	0.922	0.937
INV	0.815	0.877
IQ	0.905	0.927

OPT	0.883	0.919
SQ	0.851	0.909
SVQ	0.805	0.872
US	0.923	0.951
USE	0.773	0.869

5.7.2 Factor Loadings

High factor loadings indicate that associated indicators have much in common, and this is also referred to as indicator reliability. Factor loadings above 0.70 are deemed to be acceptable (Hair Jr et al. 2014). As part of measurement model evaluation three items, namely DISCFT_4, EFCY_1 and IMPDCY_1 were deleted because of low factor loadings (Gefen & Straub 2005). Resultantly, all the indicators had factor loadings above the threshold level of 0.7 except for EFCTV_2 with a factor loading of slightly below 0.7. This indicator was retained considering the impact of omission of EFCTV_2 from the model on AVR and CR (Hair, Joe F, Ringle & Sarstedt 2011). Table 5.10 details factor loadings for all the constructs.

Table 5.10: **Factor Loadings**

	DISCMFT	**INSEC**	**EFCT**	**EFCY**	**IMPDCY**	**INV**	**IQ**	**OPT**	**SQ**	**SVQ**	**US**	**USE**
DISCFT_1	0.755											
DISCFT_2	0.905											
DISCFT_3	0.847											
INSEC_1		0.789										
INSEC_2		0.776										
INSEC_3		0.776										
EFCTV_2			0.689									
EFCTV_3			0.715									
EFCTV_4			0.751									
EFCTV_5			0.789									
EFCTV_6			0.818									
EFCTV_7			0.835									
EFCTV_8			0.839									
EFCY_10				0.822								
EFCY_2				0.727								
EFCY_3				0.795								
EFCY_4				0.808								
EFCY_5				0.840								
EFCY_6				0.716								
EFCY_7				0.768								

EFCY_9	0.812							
IMPDCY_10		0.792						
IMPDCY_11		0.786						
IMPDCY_3		0.842						
IMPDCY_4		0.842						
IMPDCY_7		0.810						
IMPDCY_8		0.859						
IMPDCY_9		0.838						
INV_1			0.799					
INV_2			0.793					
INV_3			0.793					
INV_4			0.818					
IQ_1				0.795				
IQ_2				0.832				
IQ_3				0.789				
IQ_4				0.817				
IQ_5				0.854				
IQ_6				0.855				
OPT_1					0.780			
OPT_2					0.880			
OPT_3					0.897			
OPT_4					0.881			
SQ_1						0.873		
SQ_2						0.911		
SQ_3						0.847		
SVQ_1							0.813	
SVQ_2							0.778	
SVQ_3							0.810	
SVQ_5							0.775	
US_1								0.927
US_2								0.937
US_3								0.928
USE_1								0.831
USE_2								0.848
USE_3								0.809

5.7.3 Convergent Validity

Items measuring the same construct should converge together or should have high correlations among each other and this is demonstrated using Average Variance Extracted or AVE (Hair, JFJ et al. 2014). AVE values greater than 0.5 are considered acceptable (Hair, JFJ et al. 2014). All AVE values calculated for the study constructs were well above 0.5, establishing convergent validity. Detailed AVE results are presented in Table 5.11.

Table 5.11: **Average Variance Extracted**

	Average Variance Extracted (AVE)
DISCMFT	0.702
INSEC	0.609
EFCT	0.606
EFCY	0.620
IMPDCY	0.680
INV	0.642
IQ	0.679
OPT	0.740
SQ	0.770
SVQ	0.631
US	0.866
USE	0.688

5.7.4 Discriminant Validity

Discriminant validity is the extent to which two constructs empirically differ with each other (Hair, JFJ et al. 2014). This shows that each construct is unique and reflects a trait not captured by other constructs in the model. Discriminant validity of the model was established using two methods: i) by examining cross-loadings (Chin & Newsted 1999); and ii) by using the Fornell and Larcker (1981) criterion. While examining cross-loadings six items (SVQ_4, EFCY_8, EFCTV-1, IMPDCY_2, IMPDCY_5 and IMPDCY_6) were deleted from further analysis to achieve discriminant validity (Farrell 2010). According to Fornell and Larcker criterion (see Hair et al 2014), discriminant validity holds if the square root of AVE of a construct is greater than the highest correlation with any other construct in a correlation matrix (Hair Jr et al. 2014). Table 5.12 shows a correlation matrix of the constructs used in the model. Numbers in bold face along the diagonal represent the square root of AVE, and in all cases these square root of AVE values are greater than co-relations with any other construct. This confirms that Fornell and Larker criterion is met and discriminant validity is established.

Table 5.12: **Discriminant validity - Fornell and Larker criterion (Hair Jr et al. 2014)**

	DISCMFT	INSEC	EFCT	EFCY	IMPDCY	INV	IQ	OPT	SQ	SVQ	US	USE
DISCMFT	**0.838**											
INSEC	0.425	**0.780**										
EFCT	-0.121	-0.021	**0.778**									
EFCY	-0.057	0.004	0.759	**0.787**								
IMPDCY	-0.105	-0.075	0.766	0.732	**0.825**							
INV	0.025	-0.028	0.415	0.500	0.452	**0.801**						
IQ	-0.108	-0.138	0.335	0.355	0.39	0.255	**0.824**					
OPT	0.043	-0.004	0.545	0.582	0.513	0.518	0.302	**0.860**				
SQ	-0.098	-0.105	0.384	0.403	0.403	0.276	0.790	0.301	**0.877**			
SVQ	-0.209	-0.196	0.395	0.414	0.472	0.254	0.763	0.256	0.751	**0.794**		
US	-0.184	-0.163	0.370	0.394	0.461	0.218	0.769	0.232	0.769	0.786	**0.930**	
USE	-0.180	-0.173	0.425	0.375	0.423	0.322	0.59	0.329	0.513	0.560	0.534	**0.830**

Note: Numbers in bold face represent the square root of AVE.

5.7.5 Collinearity Assessment

Multicollinearity arises when in a regression analysis several independent variables are highly correlated with each other besides the dependent variable (Shrestha 2020). It is not desirable in a statistical analysis as it leads to unstable significance values undermining the resultant interpretations (Vatcheva et al. 2016). Therefore, before analysing the SEM structural model, it is important to examine the collinearity statistic - Variance Inflation Factor (VIF). VIF values greater than 5 suggest multicollinearity exists in the data (Hair, JFJ et al. 2014). In the sample data all VIF values are well below the threshold value of 5, suggesting no issues of multicollinearity. Detailed VIF statistics are shown in Table 5.13.

Table 5.13: VIF statistics

Indicators	VIF
DISCFT_1	1.425
DISCFT_2	2.137
DISCFT_3	1.874
EFCTV_2	1.586
EFCTV_3	1.801
EFCTV_4	1.992
EFCTV_5	2.135

EFCTV_6	2.679
EFCTV_7	2.995
EFCTV_8	2.703
EFCY_10	3.946
EFCY_2	2.392
EFCY_3	2.876
EFCY_4	2.699
EFCY_5	2.996
EFCY_6	1.826
EFCY_7	2.040
EFCY_9	3.899
IMPDCY_10	2.671
IMPDCY_11	2.606
IMPDCY_3	2.959
IMPDCY_4	2.796
IMPDCY_7	2.384
IMPDCY_8	3.054
IMPDCY_9	2.670
INSEC_1	1.285
INSEC_2	1.376
INSEC_3	1.322
INV_1	1.620
INV_2	1.704
INV_3	1.857
INV_4	1.736
IQ_1	2.354
IQ_2	2.591
IQ_3	2.068
IQ_4	2.239
IQ_5	2.612
IQ_6	2.689
OPT_1	1.909
OPT_2	2.779
OPT_3	3.009
OPT_4	2.842
SQ_1	2.668
SQ_2	3.026
SQ_3	1.669
SVQ_1	1.770
SVQ_2	1.625
SVQ_3	1.683
SVQ_5	1.513
USE_1	1.636
USE_2	1.724
USE_3	1.474
US_1	3.472
US_2	3.931

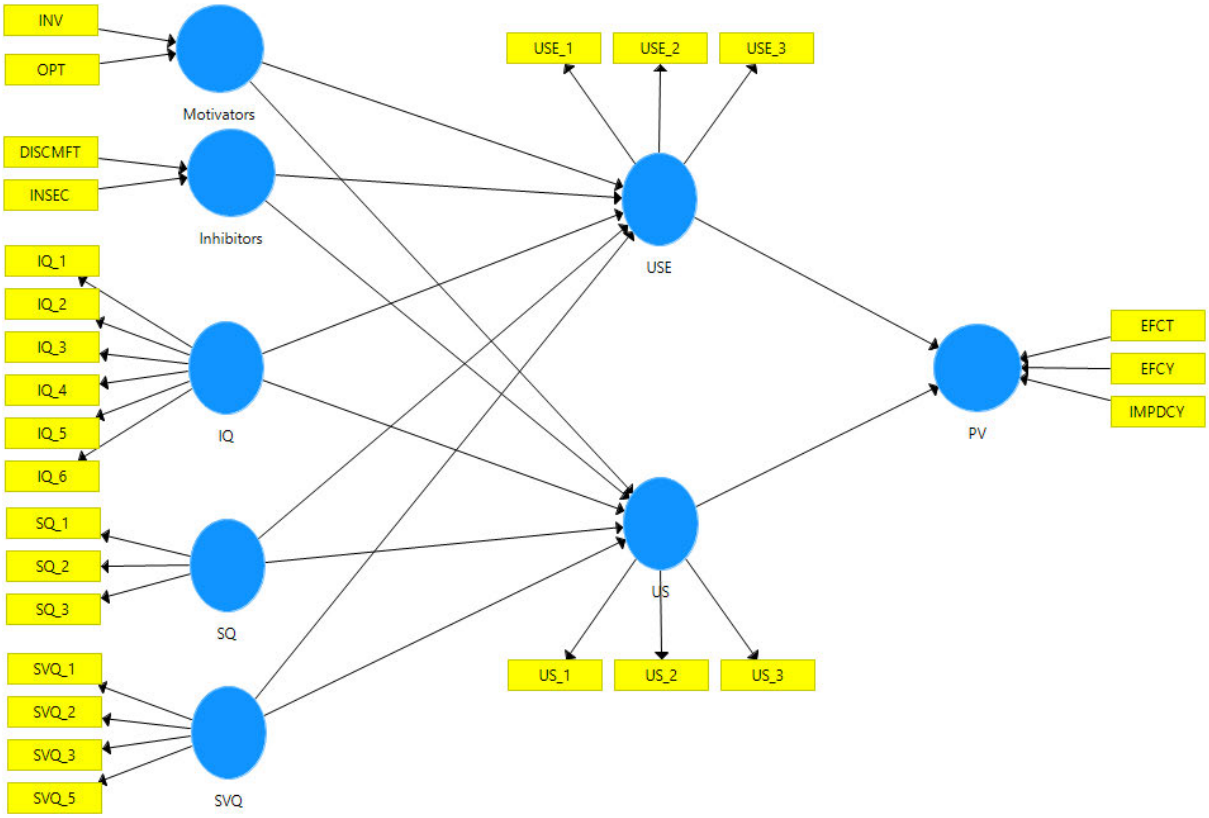
5.8 Stage-2: Measurement Model Assessment of HOC

In stage-1 of the disjoint two-stage approach, reliability and validity of the measurement model were evaluated and after that Latent Variable Scores (LVS) were obtained in SmartPLS. These LVS scores form indicators of the higher-order construct in stage two of disjoint two-stage approach (Sarstedt et al. 2019). Accordingly, LVS of the following lower-order components were obtained:

- optimism,
- innovativeness,
- discomfort,
- insecurity,
- efficiency,
- effectiveness and
- Improved democracy.

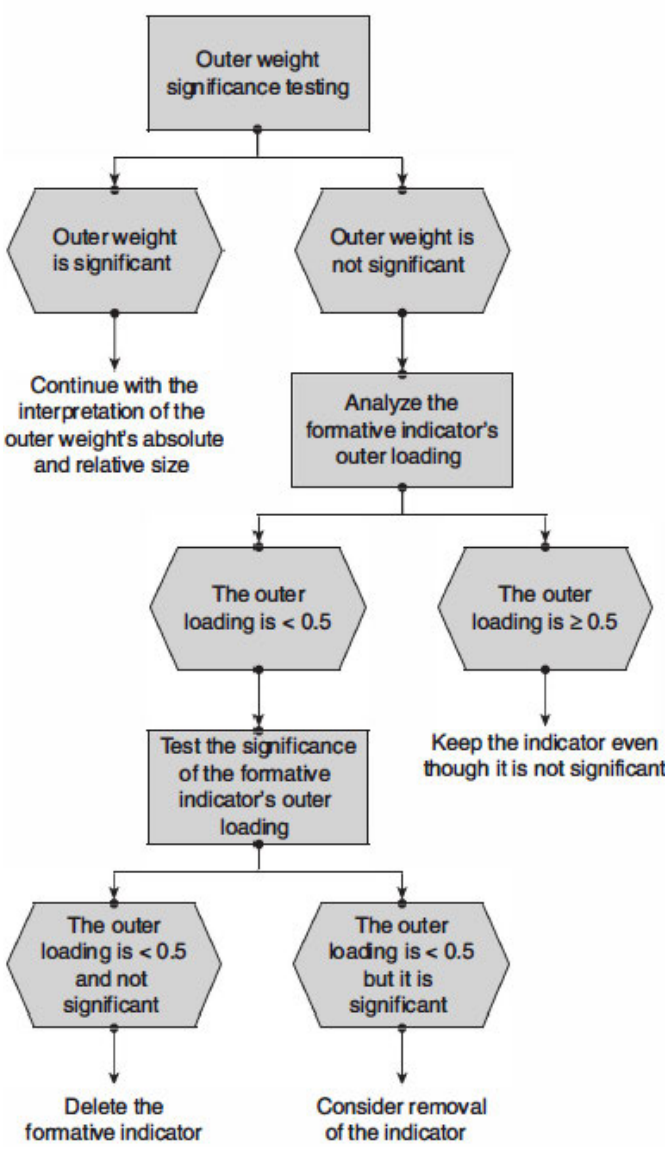
These LVS formed as indicators of the three higher-order formative constructs of motivators, inhibitors, and PV. LVS of optimism and innovativeness is used to form HOC-motivators. LVS of discomfort and insecurity is used to indicate HOC – inhibitors, and likewise LVS of efficiency, effectiveness and improved democracy is used to form HOC-PV. The SEM path model showing these higher-order constructs is illustrated in Figure 5.3 below.

Figure 5.3: Measurement model illustrating HOC



For higher-order construct validity, the significance of outer weights and outer loadings of all formative indicators is evaluated (Hair Jr et al. 2014). Outer weights of effectiveness and improved democracy were not significant, and subsequently outer loadings of indicators were examined which were all above 0.5 and significant (Hair Jr et al. 2014). Validity of higher-order formative model measurement model is established as: i) all outer loadings were greater than 0.5; and ii) no multicollinearity issues are observed, since all VIF values were less than the recommended threshold of 5 (Hair Jr et al. 2014; Sarstedt et al. 2019). The measurement model of the lower-order components, as well as the complete higher-order model including lower-order components, is evaluated (Sarstedt et al. 2019). Based on the results of stage-1 and stage-2, the measurement model is deemed to be validated. The complete decision tree used to validate higher-order formative indicators is shown in Figure 5.4.

Figure 5.4: Decision tree for retaining or deleting higher-order formative constructs (Hair Jr et al. 2014)



Detailed construct validity results for the higher-order formative measurement model are presented in Table 5.14.

Table 5.14: **Higher-order construct validity**

HOC*	LOCs	Outer Weight	T Statistic	P Values	Outer Loadings	VIF
Motivators	Optimism	0.602	4.291	0.000	0.885	1.367
	Innovativeness	0.545	3.696	0.000	0.857	1.367
Inhibitor	Discomfort	0.647	2.705	0.007	0.874	1.220
	Insecurity	0.536	2.010	0.045	0.811	1.220
Public Value	Efficiency	0.203	1.183	0.238	0.847	2.710

Effectiveness	0.199	0.946	0.349	0.868	3.037
Improved Democracy	0.673	3.922	0.000	0.974	2.777

* Higher-order Operationalisation

5.9 Structural Model and Hypothesis Testing

Once the reliability and validity of the measurement model is established, the next step is to assess the structural model (Sarstedt et al. 2019). This involves assessing relationships between different model constructs and examining predictive capabilities of the model. The key steps involved here include: i) assessing the significance of path coefficients, ii) examining R^2 value, iii) examining f^2 effect size, and iv) assessing predictive relevance Q^2 (Chin 2010; Hair Jr et al. 2014). Table 5.15 provides a short description and acceptable threshold value for each criterion.

Table 5.15: **Structural Model Assessment criteria and threshold values**

Structural model assessment criterion	**Description**	**Acceptable Threshold**
Path coefficient	Path coefficients represent the hypothesised relationships between constructs. Their value is evaluated in terms of size and significance (Hair Jr et al. 2014).	$t>1.96$, $p<0.05$ (significance level =5%) $t>2.57$, $p<0.01$ (significance level =1%) (Hair Jr et al. 2014)
Coefficient of determination- R^2 value	R^2 is value is a measure of predictive power of the model. It represents variance of the construct explained by the model (Chin 2010).	R^2= 0.67 (Substantial) R^2=0.33 (Moderate) R^2=0.19 (Weak) (Chin 1998b; Henseler, Ringle & Sinkovics 2009)
Effect Size -f^2	As the name implies, it is the size of the effect on R^2 value, when an independent variable is deleted from the model. Effect size indicates whether the deletion of the independent variable has a significant impact on the dependent variable (Hair Jr et al. 2014).	f^2=0.35 (Large) f^2=0.15 (Medium) f^2= 0.02 (Weak) (Chin 1998b)
Predictive relevance –Q^2 value	A Q^2 value above zero for a particular dependent variable indicates that SEM model has predictive relevance for the construct under examination (Chin 1998b).	$Q^2 > 0$ (Chin 1998b)

5.9.1 Path Coefficients

Since the PLS-SEM analysis is non-parametric in nature and does not assume statistical assumptions of normality of data, a bootstrapping technique was employed to test the statistical significance of path coefficients (Hair, JFJ et al. 2014). As recommended by Hair, Joe F, Ringle and Sarstedt (2011), bootstrapping procedure was carried with 5000 bootstrap samples. Results of all path estimates, t-statistic and p-values are presented in Table 5.16. The path coefficients values close to +1 indicate a strong hypothesised relationship between the model constructs and vice-versa. At *t-value* greater than 1.96 (significance level = 5 percent), the path is considered significant (Hair Jr et al. 2014). As such, both types of significance testing results (t-statistic > 1.96 or p-value < 0.05), lead to the same conclusion – that the path is significant (Hair Jr et al. 2014).

Table 5.16: **Hypothesis testing**

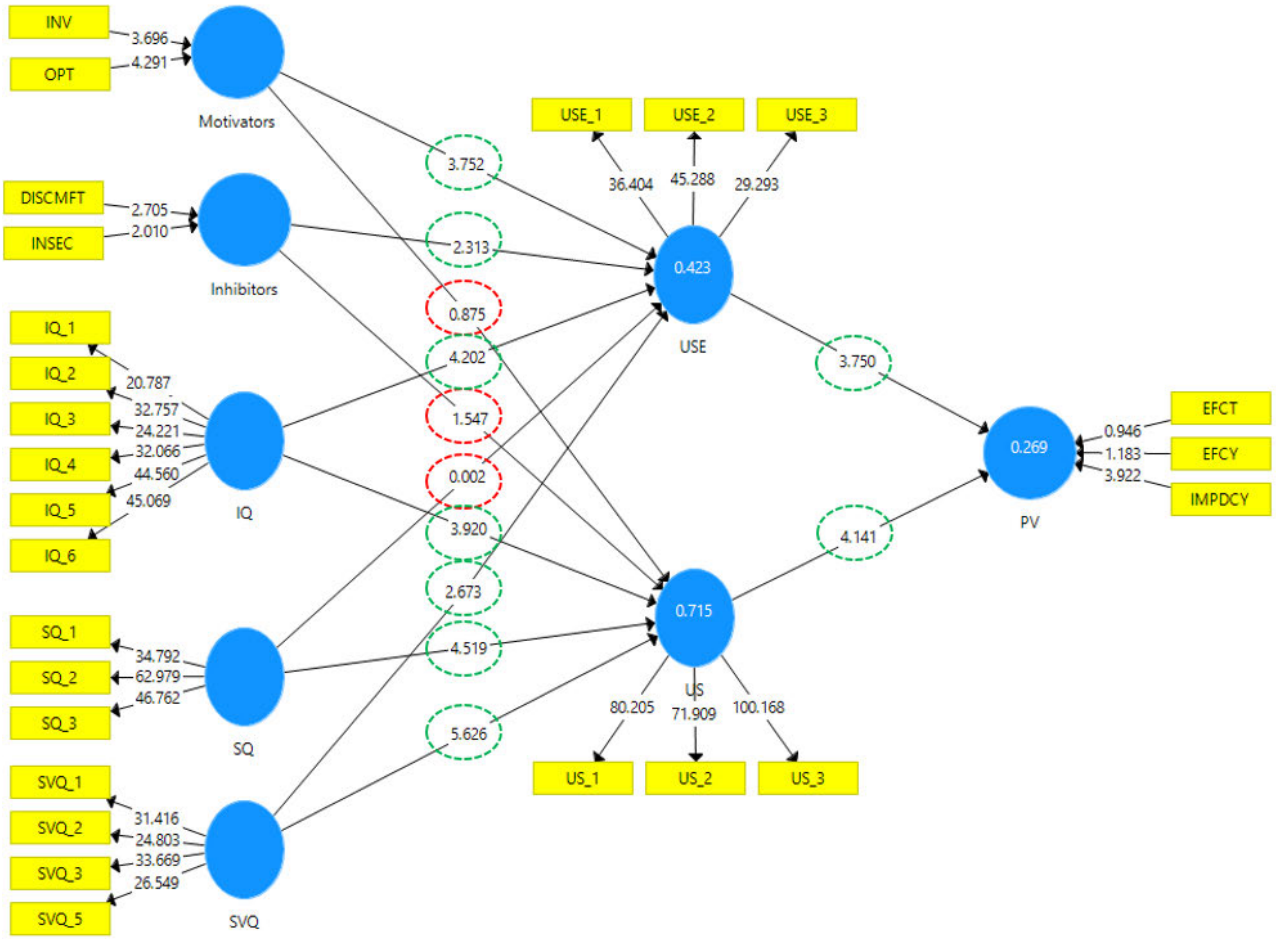
		Path coefficients	t value	p values	Decision
H1	Motivators→ USE	0.202	3.752	0.000	Supported
H2	Inhibitors→ USE	-0.110	2.313	0.022	Supported
H3	IQ→ USE	0.355	4.202	0.000	Supported
H4	SQ→ USE	0.000	0.002	0.998	Not supported
H5	SVQ→ USE	0.204	2.673	0.007	Supported
H6	Motivators→ US	-0.029	0.875	0.386	Not supported
H7	Inhibitors→ US	-0.046	1.547	0.121	Not supported
H8	IQ→ US	0.263	3.920	0.000	Supported
H9	SQ→ US	0.292	4.519	0.000	Supported
H10	SVQ→ US	0.363	5.626	0.000	Supported
H11	USE→ PV	0.276	3.750	0.000	Supported
H12	US→ PV	0.316	4.141	0.000	Supported

Table 5.16 above shows that among the twelve hypothesised relationships, nine are significant while the remaining three are insignificant. A graphical representation of the PLS-SEM path diagram showing t-statistic is shown in Figure 5.5; the significant paths are circled in **green**, whereas insignificant paths are circled in **red**. Hypotheses H1 to H5 tested the relationship of independent variables (motivators, inhibitors, IQ, SQ and SVQ) on e-Gov use (USE), whereas H6 to H10 tested the relationship of these independent variables on user satisfaction (US). H11 and H12 examined effect of USE and US on PV.

Results of hypothesis testing presented in Table 5.16 reveal that both TR dimensions, that is, motivators and inhibitors significantly influence the dependent variable - e-Gov use (USE). As expected, motivating dispositions significantly and positively influence e-Gov

USE (β=0.202 and t= 3.752), whereas inhibiting dispositions significantly and negatively influence e-Gov USE (β=-0.110 and t= 2.313). Accordingly, H1 and H2 are supported. Of the other independent variables, information quality (IQ) and service quality (SVQ) significantly influence USE, with IQ as the most significant predictor of e-Gov use (β=0.355 and t= 4.202), therefore H3 and H5 are supported. However, system quality (SQ) was found to insignificantly influence USE, so H4 is not supported.

Figure 5.5: Structural Model showing t-statistic



Note: t-value >1.96 circled in green shows significant paths, whereas t-value < 1.96 circled in red shows insignificant paths

Regarding influence of these independent variables (motivators, inhibitors, IQ, SQ and SVQ) on user satisfaction (US), both motivators and inhibitors were found to insignificantly influence the dependent variable User Satisfaction (US), accordingly H6 and H7 are not supported. It further emerged from hypothesis testing that all three system characteristics (IQ, SQ and SVQ) significantly influenced the dependent variable US. Among these three independent variables, SVQ was found to have the strongest influence on US (β=0.363 and t= 5.626). Thus, hypotheses H8, H9 and H10 were supported.

Lastly, through hypotheses H11 and H12 the influence of e-Gov use and user satisfaction (US) was examined on the higher-order construct of public value (PV). It was found that both USE and US significantly influence PV with user satisfaction as the most significant predictor of PV (β=0.316 and t= 4.141).

5.9.2 Coefficient of Determination (R^2)

Coefficient of determination also known as R^2 value represent variance of the latent dependent variable explained by the independent variables in the model (Chin 2010). In empirical studies, although the p-values or the t-value show the statistical significance of hypothesised relationships, examining and reporting R^2 is important, as it indicates the model's predictive accuracy (Hair, JFJ et al. 2014). Although acceptable values of R^2 depend on the discipline, R^2 values of 0.67, 0.33 and 0.19 are generally considered as substantial, moderate and weak, respectively (Chin 1998b; Henseler, Ringle & Sinkovics 2009). Figure 5.5 above shows that the highest variance in the model is explained by the dependent variable user satisfaction (US) that is 0.715 = 71%, followed by the dependent variable e-Gov USE which explained 0.423 = 42.3% of the variance. R^2 value for public value is found to be 0.269 ≅ 27%. Viewing the Chin (1998a) criterion, it is established that the model substantially explained variance in user satisfaction and e-Gov use, and moderately explained variance in PV.

5.9.3 Effect Size (f^2)

Effect size (f^2) represents the change is R^2 value when an independent variable is removed from the model. The change shows whether the removed variable has a substantial impact on dependent variable (Hair, JFJ et al. 2014). It can be calculated by using the following formula $f^2 = (R^2_{included} - R^2_{excluded}) / (1- R^2_{included})$, where $R^2_{included}$ and $R^2_{excluded}$ is R^2 value of the dependent variable, when a specified independent variable is either included or excluded from the path model (Chin 1998b).

As part of structural model evaluation effect size is normally reported. However, according to a recent paper by Hair, Joseph F et al. (2019), reporting f^2 is now seen as redundant because rank order of the path coefficients of the independent constructs is often the same as effect size. Accordingly, effect size is not reported as the same can be inferred from rank order of the path coefficients of independent variables (see Table 5.16). It is evident from Table 5.16 that of all the path coefficients, SVQ→ US has the highest β value of 0.363. This shows that if this construct is removed from the path model, it will have a significant impact

on the path model, followed by IQ→ USE with a β value of 0.355. Conversely, paths with the lowest path coefficients are Inhibitors→ US, Motivators→ US and SQ→ USE having β values of -0.046, -0.029 and 0.00, respectively, indicating the insignificant impact on R^2 if any of these independent variables are deleted from the path model.

5.9.4 Predictive Relevance

As a final step of structural model assessment, predictive relevance (Q^2) of the model is calculated. This measure exhibits the predictive accuracy of the model (Hair, JFJ et al. 2014). Specifically, the predictive relevance is calculated using the blindfolding procedure, which means deleting a given set of indicators and then predicting these indicators on the basis of model parameters (Akter, D'ambra & Ray 2011). Q^2 values greater than zero indicate predictive relevance of the model with 0.02, 0.15 and 0.35 considered as small, moderate and large predictive relevance, respectively (Hair, JFJ et al. 2014).

Q^2 values for the three independent latent constructs; that is, e-Gov use, user satisfaction and public value are calculated as 0.272, 0.606 and 0.200, respectively. All these Q^2 values are well above the threshold level of zero indicating moderate-to-large predictive relevance for the independent constructs (Hair, Joe F, Ringle & Sarstedt 2011). It is therefore concluded that the SEM path model depicted in Figure 5.5 has good predictive relevance.

5.9.1 Multi-Group Analysis (MGA)

MGA is an effective way of analysing heterogeneity among groups, as it allows a researcher to recognise differences across the groups (Schlägel & Sarstedt 2016). A non-parametric-based test, PLS-MGA was conducted to examine the effect of demographic variables gender, age and qualification on user perceptions of public value. PLS-MGA can be easily applied using bootstrap outputs generated within SmartPLS and does not require any distributional assumptions (Henseler, Ringle & Sinkovics 2009). The results of PLS-MGA (Table 5.17) reveal that males and females' have significantly different perceptions of PV in terms of both use and user satisfaction. This finding warrants further deeper analysis in conjunction with the earlier noted socio-economic divide (see Table 5.2).

Table 5.17: Multi-group analysis

	Path Coefficients (Female)	Path Coefficients (Male)	Path Coefficients-diff (Female - Male)	p-Value (Female vs Male)
US → PV	0.701	0.212	0.489	0.004

USE → PV	0.032	0.348	-0.316	0.044

The results show that the effect size of user satisfaction on PV is much higher in females (β=0.701, $p<0.001$) than in males (β=0.212, $p<0.05$). This shows that relationship between user satisfaction and PV is significantly higher in females compared to males. This is plausible, as Pakistan is a male-dominated patriarchal society, and females are generally not expected to interact with government agencies so they tend to be excluded from active democracy. As such, e-Gov can bridge the gender divide and empower women to access government information and services (UNDP 2008). So given the chance for women to participate in public activities using e-Gov services, empirical evidence shows that this cohort of citizens has realised higher perceptions of PV, in contrast to males who are not subject to these cultural inhibitions.

On the contrary, the effect size of e-Gov use on PV was much higher in the case of males having a β coefficient of 0.348, $p<0.001$, as compared to females with a β coefficient of 0.032 and having an insignificant relationship with of e-Gov use. This stronger relationship between e-Gov use and PV for male cohort is understandable since men are the dominant users of e-Gov services in the sample. Group differences for other demographics variables, i.e. age and qualification, were insignificant in the sample.

5.10 Discussion

Governments around the world have long been endeavouring to transform their traditional service functions to online platforms, and this transformation has now been further accelerated by the COVID-19 pandemic (Bosman 2021). Despite ostensible benefits of e-Gov in terms of improved efficiency, convenience and transparency (Bearfield & Bowman 2017; Chen, Y-C 2012; Venkatesh, Thong & Xu 2016), there is still evidently a low uptake of these services by the citizens. There is also a seeming disparity noted between the investment made and the impact achieved thereof (Otieno, Omwenga & Waema 2016; Savoldelli, Codagnone & Misuraca 2014). This is what is referred to in the literature as the e-Gov paradox and it calls for examination of e-Gov success in delivering intended outcomes (Sterrenberg 2016). Broadly speaking, the paradox signifies two issues: the tendency for low adoption of e-Gov services and not achieving the desired impact (Castelnovo 2010; Otieno, Omwenga & Waema 2016; Savoldelli, Codagnone & Misuraca 2014).

Traditional approaches to examine adoption, such as TAM (Davis 1989) and the Information System (IS) success model (Delone & McLean 2003), help explain adoption by reference to specific characteristics of technology, such as usefulness and ease of use. However, it can be argued that approaches based on these traditional models ignore individual specific dispositions that exert considerable effect (Lin, C, Shih & Sher 2007; Meuter et al. 2005). Thus, this study investigates the integrative effect of individual dispositions and technology characteristics on the adoption of e-Gov services and the resultant impact in terms of PV.

Adoption concerns the interaction between system characteristics and individual dispositions, while impact is determined by perceptions of value created by uptake of e-Gov systems. As noted in Table 5.17, perceptions of value differ significantly according to gender, an issue that has not been much addressed in PV literature, nor the impact of socio-economic groupings (Table 5.2). To explore how individual disposition and system characteristics are related to e-Gov use and user satisfaction, and in subsequent creation of PV, twelve hypotheses were devised. They are discussed in further detail in the following sections and a summary of results of hypothesis testing and research objectives is presented in Table 5.18.

Table 5.18: **Summary of the research hypotheses and results**

Research Question	Research Objective	Hypothesis	Result
What is the interplay between individual and system characteristics on adoption of e-Gov services in an emerging economy like Pakistan?	**RO-1**: Examine the interplay between individual and system characteristics on adoption of e-Gov services *(in terms of use and user satisfaction)*.	**H1**: Motivators positively influence e-Gov ***use***.	Supported
		H2: Inhibitors negatively influence e-Gov ***use***.	Supported
		H3: There is a significant, positive relationship between information quality and e-Gov ***use***.	Supported
		H4: There is a significant, positive relationship between system quality and e-Gov ***use***.	Not supported
		H5: There is a significant, positive relationship	Supported

		between service quality and e-Gov ***use***.	
		H6: Motivators positively influence ***user satisfaction***.	Not supported
		H7: Inhibitors negatively influence ***user satisfaction***.	Not supported
		H8: There is a significant, positive relationship between information quality and ***user satisfaction.***	Supported
		H9: There is a significant, positive relationship between system quality and ***user satisfaction***.	Supported
		H10: There is a significant, positive relationship between service quality and ***user satisfaction.***	Supported
	RO 2: Examine the success of e-Gov services from a citizen perceptions point of view measured in terms of public value dimensions.	**H11:** E-Gov use positively influences user perceptions of public value creation.	Supported (Use is an antecedent for PV)
		H12: High user satisfaction will positively influence user perceptions of public value creation.	Supported (User satisfaction is a more significant antecedent for PV – see QUAL section)

5.10.1 Effect of Individual Characteristics on e-Gov Use and User Satisfaction

As discussed, traditional adoption theories and models, such as TAM, UTAUT, IS success model explain adoption by reference to the specific characteristics of technology, such as perceived usefulness, perceived ease of use, complexity, compatibility, social influence, etc., or by examining the various technology design or quality dimensions associated with the technology artefact under examination (Westjohn et al. 2009). This patently technocratic

approach was perhaps suitable in earlier years but is arguably now limited. For one thing, individuals are a fundamental aspect of the adoption process. As literature has noted, it is important to examine the interaction between technology characteristics and the individual (Parasuraman & Colby 2015) and only a few studies have endeavoured to jointly study individual and technology characteristics (Lin, C, Shih & Sher 2007; Meuter et al. 2005). Results from these studies suggest a need for more comprehensive research investigating additional variables (Parasuraman & Colby 2015) relevant to adoption at an individual level. This study has attempted to do this multi-level approach, in conjunction with a focus on PV.

Some theories and models explain adoption as a function of individual characteristics. TAM, for example, rests its theoretical basis on the Theory of Reasoned Action (TRA), and states that an individual's behavioural intention is shaped by his/her beliefs and attitudes (Fishbein & Ajzen 1977). However, there is arguably sound cause to also examine (attitudinal) antecedents. The construct of technology readiness or TR is one such attitudinal variable (Westjohn et al. 2009). According to some researchers, technology readiness is instrumental in fomenting behavioural intention (Lin, J-SC & Hsieh 2007). Viewing these considerations, the construct of TR adopted from the Technology Readiness Index (TRI) by Parasuraman and Colby (2015) was included in this study. The TRI uses individual predispositions to predict a person's readiness to use new technology (Walczuch, Lemmink & Streukens 2007). As discussed in detail in Chapter 2, TRI has two sub-dimensions and is gestalt of an individuals' motivating and inhibiting dispositions. Optimism and innovativeness form the first TR sub-dimension of motivators, whereas discomfort and insecurity form the second sub-dimension of inhibitors (Blut & Wang 2020). Accordingly, the following hypotheses were framed to examine the effect of motivators and inhibitors on e-Gov use and user satisfaction:

H1: Motivators positively influence e-Gov use.

H2: Inhibitors negatively influence e-Gov use.

H3: *see section 5.10.2 (related to system characteristics)*

H4: *see section 5.10.2 (related to system characteristics)*

H5: *see section 5.10.2 (related to system characteristics)*

H6: Motivators positively influence user satisfaction.

H7: Inhibitors negatively influence user satisfaction.

The Structural Equation Modelling (SEM) analysis revealed that motivators having sub-dimensions of optimism and innovativeness positively and significantly influenced e-Gov use (β=0.202 and t= 3.752). Conversely, inhibitors that included sub-dimensions of discomfort and insecurity significantly and negatively influenced e-Gov use (β=-0.110 and t= 2.313). As motivators and inhibitors collectively constitute Technology Readiness (TR), and having found a significant relationships as proposed by (Parasuraman & Colby 2015) the construct of TR is deemed to be validated in the context of e-Gov adoption in Pakistan.

These findings are consistent with the existing literature (Alharbi & Sohaib 2021; Blut & Wang 2020; Chen, S-C, Liu & Lin 2013; Lam, Chiang & Parasuraman 2008; Lee, V-H et al. 2020), where motivating dispositions are found to be positively related to a context of technology adoption while inhibiting dispositions are negatively related. Results of hypothesis testing found a stronger positive influence of motivators on e-Gov use with a beta coefficient of 0.202, as compared to inhibitors with a beta coefficient of -0.110. This finding suggests citizens give more weight to the perceived advantages of the technology, rather than the disadvantages when deciding to use e-Gov services. This result also corroborates similar findings reported by Blut and Wang (2020), who suggest there is a stronger effect of motivators relative to inhibitors on technology readiness.

Conversely, both individual disposition of motivators and inhibitors did not seem to have any significant effect on user satisfaction. The results of SEM path modelling and hypothesis testing shown in Table 5.16 revealed that motivators having sub-dimensions of optimism and innovativeness insignificantly influenced user satisfaction (β=0.029 and t= 0.875). Similarly, inhibitors having sub-dimensions of discomfort and insecurity also did not have any significant effect on user satisfaction (β=-0.046 and t= 1.547). These findings are partially consistent with existing literature where an insignificant effect of inhibitors is reported on user satisfaction (Ab Halim 2012). This insignificance of TR dimensions on user satisfaction can be explained by the fact that essentially TR reflects intrinsic disposition of citizens to use e-Gov services. Accordingly, the significance of TR is on e-Gov use, is evidenced by hypotheses H1 and H2 that examined the effect of TR dimensions on e-Gov use. In contrast, user satisfaction is more of a factor of gaining utilitarian benefits (Lee, S & Kim 2018). In the case of e-Gov services it amounts to being able to get current information or experience better service quality. Path analysis shows user satisfaction (US) is more influenced by system characteristics, reflecting utilitarian benefits rather than internal TR dispositions. The effect of system characteristics on use/ user satisfaction is discussed in detail below.

5.10.2 Effect of System Characteristics on e-Gov Use and User Satisfaction

To examine the impact of system characteristics on e-Gov ***use*** and ***user satisfaction***, three system quality characteristics are adapted from Delone and McLean (2003) IS success model. These characteristics are information quality, system quality and service quality. Information quality represents the characteristics of information provided by an e-Gov system such as its relevance, accuracy and comprehensiveness (Floridi 2013; Teo, Srivastava & Jiang 2008). System quality refers to the desirable features of an information system that include availability, reliability and usability (Petter, DeLone & McLean 2008). In contrast, dimensions of service quality are responsiveness, ease of use and problem resolution (Teo, Srivastava & Jiang 2008).

The following hypotheses regarding influence of information quality, system quality and service quality on e-Gov use and user satisfaction were tested:

> **H3**: There is a significant, positive relationship between information quality and e-Gov use.
>
> **H4**: There is a significant, positive relationship between system quality and e-Gov use.
>
> **H5**: There is a significant, positive relationship between service quality and e-Gov use.
>
> **H6:** *see section 5.10.1 (related to individual characteristics)*
>
> **H7:** *see section 5.10.1 (related to individual characteristics)*
>
> **H8**: There is a significant, positive relationship between information quality and user satisfaction.
>
> **H9**: There is a significant, positive relationship between system quality and user satisfaction.
>
> **H10**: There is a significant, positive relationship between service quality and user satisfaction.

The results of PLS SEM modelling show that information quality (IQ) and service quality (SVQ) dimensions of system characteristics, significantly and positively influence e-Gov use with path coefficients and t-values of (β=0.355 and t= 4.202) and (β=0.204 and t= 2.673), respectively. These findings are consistent with IS literature, which suggests that IQ and SVQ positively influence ***use*** behaviour (Pal & Arpnikanondt 2021; Rana, Dwivedi, Williams & Weerakkody 2015; Sorongan & Hidayati 2020; Wang, Y-Y et al. 2019).

The third dimension of system characteristics, that is system quality, was found to have insignificant effect on e-Gov ***use*** (β=0.00 and t= 0.002). This finding was unexpected. Regarding influence of system quality on e-Gov use, contradictory findings are reported in literature. While some studies report significant influence of system quality on use (Ojo 2017; Petter & McLean 2009; Wang, Y-Y et al. 2019), others reported no significant influence of system quality on use (Sorongan & Hidayati 2020; Wang, Y-S & Liao 2008). A plausible explanation for this subtle distinction may be in the now relative maturity of ICT and related technologies to the extent that system quality is considered a de-facto given and so is no more relevant for users (Sorongan & Hidayati 2020; Wang, Y-S & Liao 2008). To elaborate further, as e-Gov services can only be accessed through telecommunications services, smart phones, and other such like devices that have now become ubiquitous, users consider this aspect of system characteristics as a default. There is another possible explanation; the demographics of the sample indicated that most of the study participants are from the middle and upper-middle socioeconomic group with relatively high education qualifications. Such a population is likely to have high computer self-efficacy and for this group, system quality may not be a critical consideration that influences use (Wang, Y-S & Liao 2008). Arguably, also, given a more discerning user population, the matter of user satisfaction may prove to be a significant influential factor in wider e-Gov uptake.

The influence of the three dimensions of system characteristics were also tested on ***user satisfaction***. The results of PLS SEM modelling reveal that all three system quality dimensions - information quality, system quality and service quality - positively and significantly influence user satisfaction (US), with path coefficients and t-values of (β=0.263 and t= 3.920), (β=0.292 and t= 4.519) and (β=0.363 and t= 5.626), respectively. These findings are consistent with the literature, where strong influence of IQ, SQ and SVQ is found on user satisfaction (McLean & Osei-Frimpong 2017; Pal & Arpnikanondt 2021; Rana, Dwivedi, Williams & Weerakkody 2015; Sorongan & Hidayati 2020; Wang, Y-Y et al. 2019).

Amongst all the antecedents of e-Gov use, information quality has the strongest effect on e-Gov use with a beta coefficient of 0.355, whereas service quality is found to have the strongest effect on user satisfaction with a beta coefficient of 0.363. This suggests that citizens' use of e-Gov services is largely influenced by information quality aspects of these services. The policy implication for this finding is that governments should primarily focus on delivering high quality and up-to-date information. Once people start using these

services, ongoing use and user satisfaction are arguably contingent upon the provision of high-quality service (SVQ).

5.10.3 Antecedents of Public Value Perceptions

Public value or PV is the significance recognised by citizens from their experience of public service and government policies (Moore 1995). The concept describes a new way of evaluating government services in terms of efficiency, effectiveness and social values (Bryson, Crosby & Bloomberg 2014; Stoker 2006). PV theory offers a basis to examine the effect of e-Gov service initiatives (Panagiotopoulos, Klievink & Cordella 2019) and particularly how much value is created for citizens (Bannister & Connolly 2014; Panagiotopoulos, Klievink & Cordella 2019). This idea (of creating value) is supported by (Harrison et al. 2012), who argue that PV can be used as a means of meeting citizens' expectations and it should be the goal of all public sector agencies. Therefore, e-Gov and PV seek to achieve similar objectives of creating efficiencies in public processes and enhancing peoples' trust on government (Bryson, Crosby & Bloomberg 2014; Twizeyimana & Andersson 2019b). Specific to the success of an e-Gov based IS system Scott, M, DeLone and Golden (2016) proposed a public value-based construct to measure success from the perspective of citizens with sub-dimensions of efficiency, effectiveness and improved democracy. Accordingly, the higher-order construct of PV was operationalised using these sub-dimensions. The following hypotheses examined the influence of e-Gov use and user satisfaction on PV:

> **H11:** E-Gov use positively influences user perceptions of public value creation.
>
> **H12:** High user satisfaction will positively influence user perceptions of public value creation.

The results of PLS SEM modelling reveal that both e-Gov ***use*** (USE) and ***user satisfaction*** (US) significantly and positively influence user perceptions of PV. These findings are largely consistent with the PV literature (Freeze et al. 2010; Kearns 2004). Path coefficients and t-values for USE are (β=0.276 and t=3.750), whereas path coefficients for US are (β=0.316 and t= 4.141). Consequently, it can be argued that people who use e-Gov services will have strong perceptions of PV in contrast to people who use these services to a lesser extent or not use at all.

Among both antecedents of PV perceptions, user satisfaction has the strongest effect on creation of PV perceptions with a beta coefficient of 0.316. This result suggests that to

increase perceptions of PV among citizens, it is important to create user satisfaction and this can be achieved by having e-Gov systems that are secure and reliable (system quality), providing responsive services (service quality), and having up-to-date information (information quality). As user satisfaction has a significant positive effect on PV, it implies that greater the user satisfaction the higher will be the perceptions of value for citizens. These findings are consistent with results reported by Alawneh, Al-Refai and Batiha (2013) in the context of measuring user satisfaction with e-Gov services in Jordan. In that study the authors noted user satisfaction as a significant determinant of success or failure of an e-Gov initiative. In view of the above discussion, it is evident that both e-Gov use and user satisfaction significantly influence PV. As governments ultimately want to create PV for their citizens (Moore 1995), the empirical evidence is that user satisfaction has a significant influence on PV.

5.11 Summary

This chapter presented the results of the QUAN phase of the study. The results were then discussed in relation to the various hypotheses towards the latter part of the chapter. In doing so RO1 and RO2 of the study are answered. Quantitative analysis was performed on 291 completed samples using SPSS and SmartPLS.

To address RO1, i.e., to examine interplay between individual and system characteristics on e-Gov adoption (in terms of use and user satisfaction), ten hypotheses, namely H1 to H10 were framed. SEM analysis and hypothesis testing showed that individual characteristics operationalised through the construct of technology readiness (TR) is a good predictor of e-Gov use but it is not for user satisfaction. The results of hypothesis testing further revealed that all three system characteristics, that is, information quality, system quality and service quality significantly influenced user satisfaction, with service quality being the strongest predictor of user satisfaction. As well, the results of the PLS-MGA (Table 5.17) reveal that males and females have a significantly different perceptions of PV both in terms of use and user satisfaction. The finding warrants further deeper analysis in conjunction with the earlier noted socio-economic divide (Table 5.2).

To address RO2, i.e. to examine the effect of e-Gov use and user satisfaction on perceptions of PV, H11 and H12 were tested. The results revealed that user satisfaction is the strongest predictor of PV. In a process sense, it is also argued that PV is an outcome e-Gov use (adoption) but is primarily contingent upon user satisfaction. These findings, shaped perhaps by a population of educated (and hence more discerning) users, suggests user

satisfaction is a significant influencing factor in further e-Gov uptake, which is used as distinct to adoption that seems technologically focused and less discerning of user need.

The next chapter presents and discuss the results of QUAL phase of the study. This analysis will help extend the QUAN findings discussed above, with a thematic analysis used to help bridge what some call the Quant-Qual divide (Terry et al. 2017).

CHAPTER 6: QUALITATIVE (THEMATIC) ANALYSIS & DISCUSSION

6.1 Introduction

The theoretical basis of the study is pragmatism and hence the focus is on practical application. Both quantitative and qualitative data collection techniques have been used to collect data. Earlier, in Chapter 5, we examined the quantitative (QUAN) results in relation to the various hypotheses associated with RO1 and RO2. Test results were presented and related findings of the study were discussed. This chapter presents a thematic analysis of the qualitative (QUAL) data based on the two open-ended questions included in the survey, and the 1:1 online interview with e-Gov managers and executives working in government departments responsible for implementing the Digital Pakistan Policy (DPP). The open-ended survey response offers a user-view related to adoption and PV; the interviews with public sector managers and executives offers a practitioner or managerial viewpoint of e-Gov adoption and PV issues.

A thematic analysis served to bridge the Quant-Qual divide (Terry et al. 2017). Remaining consistent with the conceptual framework, data related to adoption is discussed first, followed by an analysis of data related to PV. The chapter is organised as follows: the process of qualitative data collection and thematic analysis is outlined first. This is followed by a presentation of managerial and citizen narratives and a detailed thematic analysis of composite QUAL data. The QUAL data is then collated via a Force Field Analysis (FFA) that places enabling and constraining factors for e-Gov uptake and PV creation in Pakistan. The chapter ends with a synthesis of QUAL and earlier QUANT findings in the form of a policy and practice framework to support successful adoption and creation of PV in an emerging economy.

This chapter will address the following ROs:

- **RO 2.1:** Identify the key issues that help/hinder creation of public value.
- **RO 2.2:** Identify enabling and constraining factors that influence citizen adoption and creation of PV in an emerging economy like Pakistan**.**
- Findings from this and the preceding QUANT analysis are then synthesised to address **RO 2.3** (a summative objective related to both RQ1 & 2); to develop a policy and practice framework to support successful adoption and creation of PV in an emerging economy).

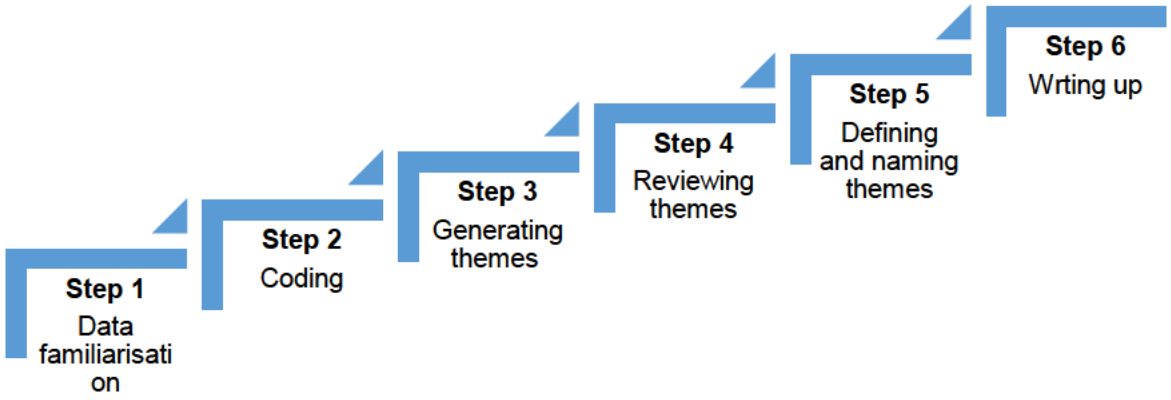
6.2 QUAL Analysis

The QUAL data is based on two open-ended questions in the online survey and one-to-one semi-structured interviews with e-Gov practitioners. Open-ended questions were included in survey as a way to allow new and richer ideas to emerge, as well allowing respondents an opportunity to express their ideas more freely (Züll 2016). This option attracted a positive response with many respondents taking the opportunity to offer comments. A total of nine interviews were completed. All interviewees were held with senior management or executive level employees, who were selected on their capacity to provide policy and practical insights concerning e-Gov implementation and the creation of PV in Pakistan. Qualitative data was analysed using NVivo 12 Pro.

6.3 Review of Thematic Analysis (TA)

Thematic analysis (TA) enables a researcher to examine and systematically organise the data to extract patterns, analyse and then report answers to the research question (Smith & Firth 2011). It is described as a rigorous approach that can yield rich and insightful analysis (Braun & Clarke 2006). A TA follows a six-step process as shown in Figure 6.1 (Braun & Clarke 2006).

Figure 6.1: Thematic analysis process adapted from (Braun & Clarke 2006)

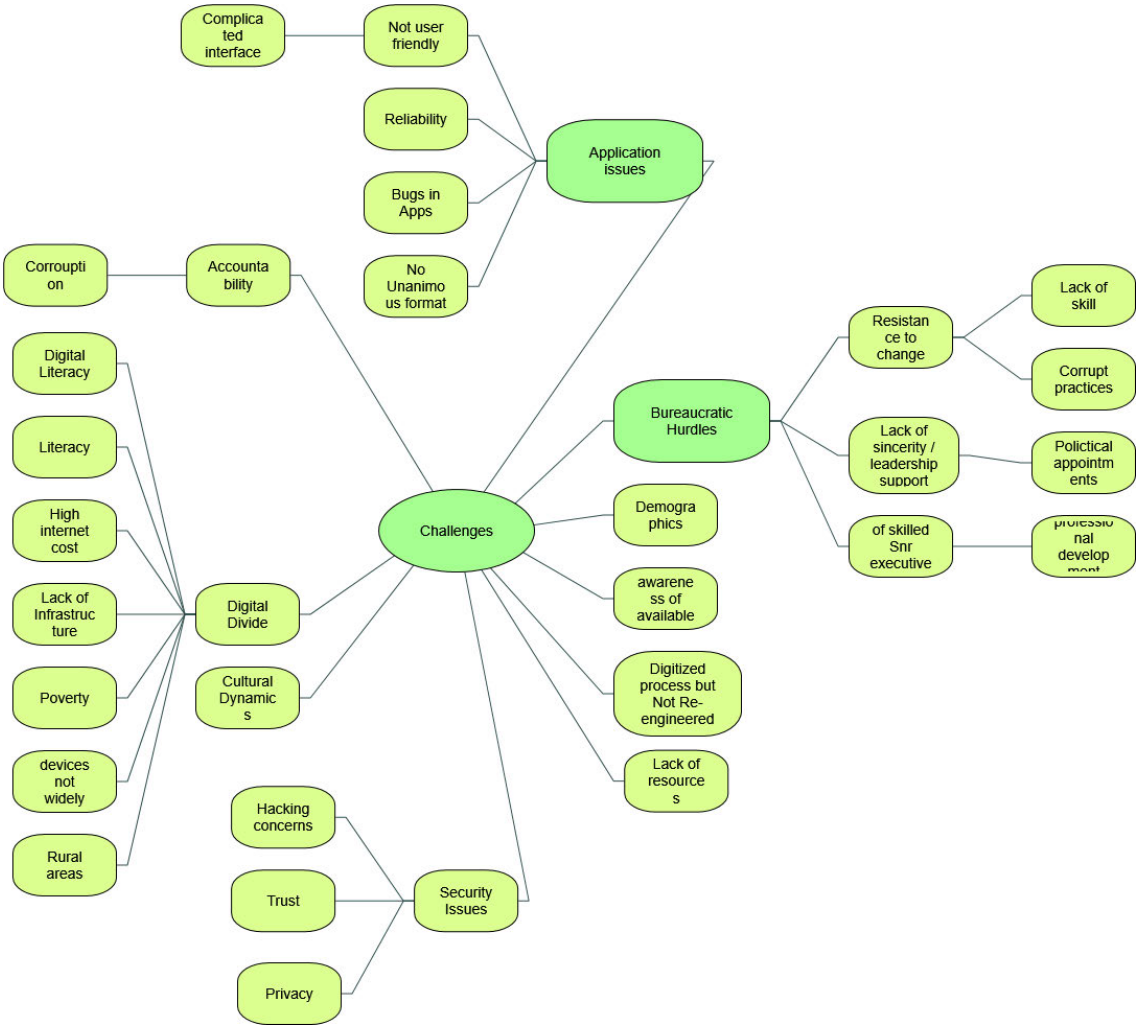


6.3.1 Stage 1: Data Familiarisation

The qualitative analysis phase commenced with familiarisation and transcribing data as illustrated in Figure 6.1 (Braun & Clarke 2006). The transcripts were read and carefully perused multiple times to get a good sense of the data. Notes were taken on paper as well as in NVivo using memo and annotation features. At this stage mind maps were drawn in NVivo using a brainstorming tool to visually see and connect ideas. A mind map of the key

challenges in e-Gov uptake and value creation is shown in Figure 6.2. It depicts the thought processes and ideas that emanated around this topic during the data familiarisation phase.

Figure 6.2: Mind map – e-Gov Challenges (NVivo)



6.3.2 Stage 2: Coding

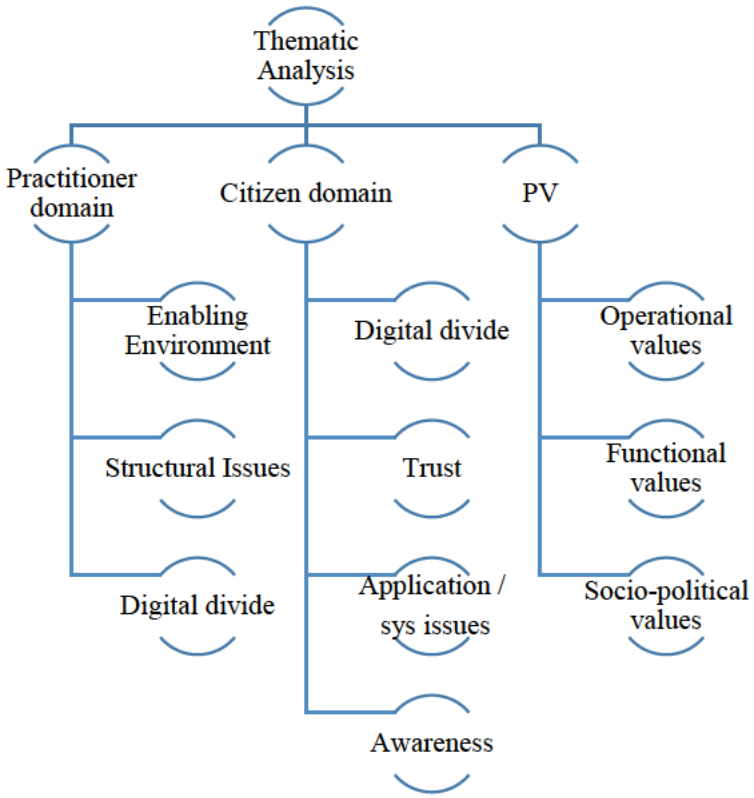
After familiarisation, the next step was to code the data. Coding means to use a short word or phrase that summarises a portion of textual or visual data (Saldaña 2021). It is considered a fundamental unit of analysis in qualitative analysis (Braun & Clarke 2006). At an early stage, raw transcripts were re-read, and interesting and relevant segments of data were coded by giving them meaningful titles. These codes became the building blocks for the later detailed thematic analysis that is discussed in subsequent sections.

6.3.3 Post-coding Stages -Searching for Themes in PV

Identifying key issues that influence creation of PV was an important aspect of qualitative inquiry. Once the data was coded, the next step was to sort and group the codes into potential themes or sub-themes. Thematic maps designed in NVivo are presented in the later thematic

analysis section. After the initial theme construction, themes were reviewed, consolidated, and refined. To examine the prevalence of a pattern, code reference counts were used as an indication and some themes were merged into others due to overlapping concepts or dropped altogether. Finally, the remaining themes were grouped into three broad domains: practitioner (manager)-related issues, citizen (user)-related issues and issues involved in the creation of PV, as depicted in Figure 6.3. Three parent nodes or domains are illustrated (practitioner, citizen, and PV), each with subordinate child nodes as illustrated in Figure 6.3.

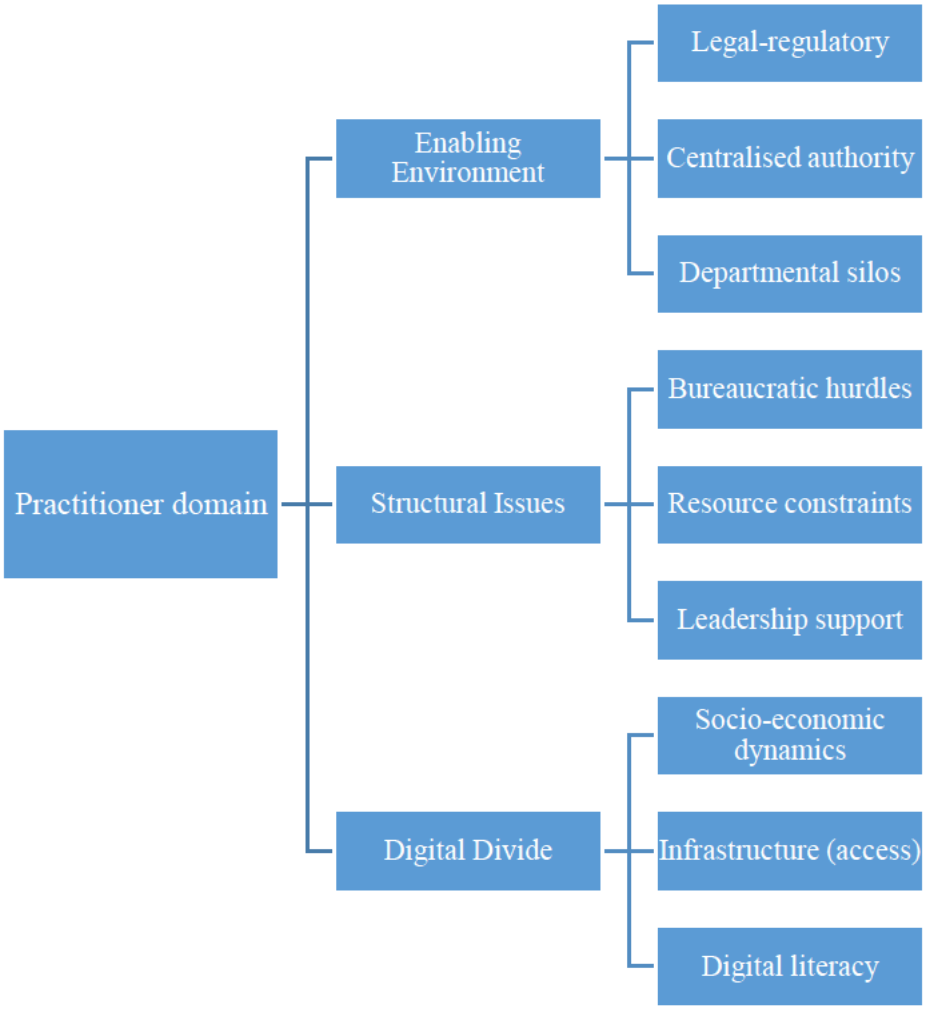
Figure 6.3: Thematic analysis overview



6.4 Key Issues that Influence Creation of PV (RO 2.1)

To understand the key issues influencing uptake of e-Gov and to examine the impediments to realising PV in Pakistan, it was important to first take stock of what we term the practitioners' (government policy and managers) domain. Untangling these issues helps answer RO 2.1, *identify the key PV issues that help/hinder creation of public value*. Three broad themes from a practitioner's point of view were identified: *enabling environment*, *structural issues,* and a prevailing *digital divide*. These themes are identified not merely based on quantifiable measures (nodes), but with due consideration also given to the relevance of the theme to the overarching research question (Braun & Clarke 2006). These themes and the related sub-themes are shown in Figure 6.4.

Figure 6.4: Thematic nodes – Key issues that influence PV



6.4.1 Creating an Enabling Environment

An enabling environment is one where government authorities give due legal and regulatory considerations to public policy formulation in order to create the facilitating conditions for digital services to grow or expand (Guermazi & Satola 2005). The absence of legislative and regulatory frameworks which are necessary for such an environment is one of the fundamental issues emerged in interviews with e-Gov practitioners. This theme is abstracted from three sub-themes: i) legal-regulatory issues; ii) lack of a centralised e-Gov authority; and iii) departmental silos.

Arguably, legislative frameworks are a fundamental tool to create a functioning environment (Guermazi & Satola 2005). Regulatory power flows from enacted laws. As Pakistan is a federal democracy, laws are enacted by the parliament. However, due to varied interests of political parties, often governments face resistance to enact new laws. A similar situation is observed in the case of formulating e-Gov laws and regulations in Pakistan, as government face seeming stiff resistance to make legal changes from opposition parties,

largely due to political considerations. This political tussle has been detrimental to creating an overall enabling environment for e-Gov implementation in Pakistan. One such example is the case of e-voting legislation, which has been in limbo for quite some time as the government has not been able to bring about the required legal changes to implement this initiative. As participant 9, a senior executive in the public-service, noted:

> *The incumbent government wants to implement e-voting in the next elections in order to allow overseas Pakistanis [a] right to vote through [an] e-voting system. This requires a constitutional change for which government doesn't have a two-thirds majority in the parliament. Opposition parties think e-voting will be unfavorable to their interests and do not support government and hence government is unable to enact a law in this regard.*

Similar views regarding a lack of legal and policy framework in cyberspace policy were expressed by participant 8, who commented:

> *You may be surprised to know that although e-Gov talk is within government papers for around 15-20 years now, our cyber security policy is still in draft shape. Thankfully it is in process of approval now and we hope it will see the light of day soon, but how can you expect growth of ICT enabled services in the absence of cyber security laws and policies?*

In a nutshell, participants indicated the overall legislative and policy framework needed to support e-Gov initiatives is weak. This is due to a myriad of issues, including political differences at the top level and a legal-regulatory void, and this the fundamental issue that inhibits the creation of a suitable enabling environment for greater uptake of e-Gov services in Pakistan.

Another issue that came to the fore in discussions with participants was the lack of a central body to steer the e-Gov agenda. Although Pakistan has a central telecommunications regulator, the need of a centralised IT/e-Gov authority was emphasised. Due to the absence of such a centralised function, there is a reported ad-hoc approach by organisations, for example, in adopting different standards for IT equipment that are often not compatible with one other. The net result is problematic service integration and interoperability difficulties (Manda & Backhouse 2016). Reflecting the lack of a central IT regulatory body, participant 6 noted:

> *In Pakistan, PTA has installed mobile Device Identification, Registration and Blocking System (DIRBS). Under this system every ordinary phone brought into the country from abroad needs to be registered with PTA and type approved, otherwise the phone cannot be used as DIRBS block usage of unregistered phones, however organizations can commission any IT system fulfilling their needs but without considering its upstream and downstream compatibility with other public organizations. There clearly is a need for a standardized IT body*.

Similarly, elaborating the need for an integrated body and raising the issue of organisations without clear demarcation of responsibilities among them, participant 8 asserted:

> *There are too many organizations doing similar sorts of work and sometimes working in opposite directions. For example, we have National IT Board (NITB), National Telecommunication Information Security Board (NTISB), Electronic Certification Accreditation Council (ECAC), Pakistan Telecommunication Authority (PTA) to name a few. All these organizations have some role in the e-Gov implementation, but a holistic approach is missing. As they say, too many cooks spoil the broth.*

The qualitative narrative of the practitioner domain suggested that several organisations are tasked with the implementation of e-Gov, but they have overlapping functions that contribute towards a lack of direction and absence of a homogenous approach. The need for a centralised authority is clear to oversee e-Gov implementation and a fully functional e-Gov system requires different organisations to talk with each other and share data, rather than operate in stovepipes or silos. The core change needed, also consistent with the literature, is of legislative direction and suitable policy instruments that define the rules for information sharing and use of technology platforms across government organisations (Yang, T-M & Wu 2015).

6.4.2 Structural Issues

In discussions with key stakeholders, three broad structural issues were identified. These are bureaucratic hurdles, resource constraints in public organisations, and leadership support. These issues categorised as sub-theme of structural issues are discussed below.

6.4.2.1 Bureaucratic Hurdles

E-Gov is often seen as a mechanism to navigate bureaucratic red tape in public sector organisations (Cordella & Tempini 2015). Unfortunately, often it is the bureaucracy itself

that is resistant to change (Pereira et al. 2017). Bureaucratic resistance is a key structural impediment highlighted by respondents. As participant 7, a senior manager, reported:

> *You know, it's [more] difficult to unlearn than to learn. It is very hard to change the attitude of people who have always worked on physical files and convince them to use these electronic platforms. Sometimes they have skill issues but often they are skeptical of technology. I can recall, when we implemented e-Office system a few years ago one of the members of our team would print and make a physical file of every correspondence of e-Office system. When inquired he said, you never know when this digital data wipes out, and tomorrow if I have to face an audit or an inquiry, I may not have anything to substantiate [my decisions]!*

Similarly, participant 9, another senior executive stated:

> *These systems (e-Gov) promote efficiency and make people accountable. Now you cannot keep sitting on a file for days and weeks, because if you do not action a file for a specific number of days, it is automatically escalated. Traditional "baboos" (bureaucrats) do not want this sort of vigilance on them.*

These views suggest that participants, especially the senior leaders in public sector organisations, are aware of and find bureaucratic resistance a considerable challenge for e-Gov value creation. Many other countries face similar bureaucratic resistance in implementing e-Gov initiatives. Yet, as the example of South Korea shows, it is possible to overcome such resistance by upskilling, by building a culture of swift response to technical issues and by ensuring strong leadership support (Moon, MJ 2019).

6.4.2.2 Resource Constraints

E-Gov initiatives are capital intensive projects. As such, affordability of these initiatives is a real challenge for emerging economies (Joshi, P 2019). Pakistan, being a low-middle income country, is faced with budgetary constraints and funding challenges. Public sector organisations generally do not have enough resources to invest capital in such resource intensive projects and so often rely on foreign funding for e-Gov projects. This dependence, however, is not sustainable in the long run. As noted by participant 7:

> *Government does not allocate a dedicated budget for e-Gov projects. The majority of e-Gov projects are funded by foreign agencies. For example, almost all health-related projects are funded by the World Bank. I believe, government should take*

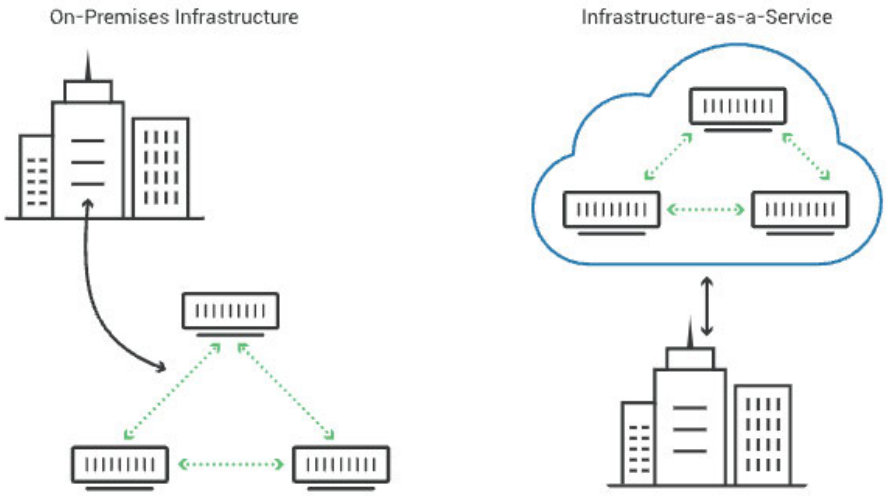
ownership and allocate a budget to these projects like they do for other government expenses on the human resource, procurement, infrastructure, etc.

In the absence of dedicated funding, effectively the project ends when the funding ceases as no one is willing to take ownership of the project. A similar view was echoed by participant 9:

Meagre amount of budget is allocated for e-Gov projects. Utilizing that budget has been made even difficult as there are a lot of processes involved to sanction even small amount of funds. I think we need to go for public-private partnership or other innovative project financing and execution mechanisms. For example, now you don't actually need to buy expensive equipment and applications and hire staff to run these applications. You can hire processing power and software as a service from different data centers. Government departments really need to think in this direction, rather than trying to build everything from scratch.

In Pakistan, all public sector projects are financed by the government. Considering the resource intensive nature of these projects, government financing is never enough. The traditional approach for infrastructure development is through public sector financing, especially in developing countries. However, innovative structuring and financing strategy is needed to build e-Gov capability (Ojha & Pandey 2017). Some examples of such strategies are public-private partnerships or leasing cloud-based IT infrastructure (see Figure 6.5).

Figure 6.5: On premises infrastructure vs Infrastructure as a service (IaaS) (Serrano, Gallardo & Hernantes 2015)



Technological advancements have now made it possible for organisations to not own any physical IT infrastructure themselves, but rather to lease infrastructure or application as a service from specialised cloud-based data centers (Van Rossem et al. 2018). Some of these cloud-based services include infrastructure as a service (IaaS), software as a service (SaaS) and Platform as a Service (PaaS). Utilising these services, government agencies can lease expensive infrastructure, platforms, or services instead of building all this infrastructure on their own. This approach is not only cost-effective but also more flexible and scalable (Serrano, Gallardo & Hernantes 2015). From the interview discussions it transpired that National Telecom Corporation, which is tasked with fulfilling the government's IT needs, provides these cloud-based data center services, however these are not widely adopted due to apprehensions about quality of services and inclination of some organisations to build their own infrastructure. This tendency by different government agencies to build their independent infrastructure to support e-Gov services not only cause duplication but is also resource intensive. Therefore, it is argued that at the project implementation stage, government should make use of the latest cloud-based technologies, rather than building everything from scratch. Need of a centralised agency discussed earlier is also emphasised at this stage.

6.4.2.3 Leadership Support

Implementing e-Gov initiatives is not only a technical endeavour, but also an organisational challenge (Raguseo & Ferro 2011). Among other structural issues discussed above, lack of effective leadership is also identified during interviews with participants. Top management support is displayed by management giving time to the e-Gov initiative, resolving problems and following up on project outcomes (Young & Jordan 2008). These messages in many instances are not being conveyed to organisational rank and file. As participant 3 mentioned:

> *Management is not tech savvy. Even if they advocate for e-Gov initiatives among their subordinates, they would themselves like to work on paper files. I reckon, this is the specific reason for failure of office automation project in this organization. Initially people started using this e-Office application, however when they saw management actually preferred to use the legacy system, the use [of the e-Office application] was naturally abandoned.*

Another leadership issue that came to the fore during discussions was that often conventional civil service officers are appointed to technical organisations tasked with e-Gov implementation. However, complex initiatives like e-Gov projects require forward-

looking leaders with the relevant technical background in order to steer e-Gov initiatives suitably (Al-Shuaili et al. 2019). As participant 2 elaborated:

> *There was an organization named EGD (Electronic Government Directorate) and purpose of that organization was to guide government towards the digitization and to improve adaptability of digitization of electronic data but that failed because of appointment of non-professional top executives. I mean bureaucrats were assigned the top jobs to run such a technical organization and that resulted in collapse of the whole department.*

The importance of strong leadership for PV creation is emphasised in existing literature (Qureshi et al. 2013; Ziemba et al. 2016). What was described as visionary and supportive leadership were described as essential for the success of e-Gov initiatives, particularly as e-Gov may be associated with staff downsizing and so regarded by some government officials as detrimental to their interests. To allay resistive activities against e-Gov initiatives, leadership was seen as important to not only provide the long-term vision but to building trust and confidence of government officials. Leadership actions to build confidence in employees includes opportunity for digital upskilling, which can increase acceptance of e-Gov by staff and so enable success of these initiatives (Dukić, Dukić & Bertović 2017).

A related issue and one that interviews revealed as a significant challenge to implementation of e-Gov initiatives is misplaced appointments. In Pakistan, most civil servants are inducted through a Central Superior Service (CSS). These officers form the bureaucratic apparatus of the country and they run the different departments and ministries. There are many different branches of the civil service, such as the Foreign Service, Police Service, Audit and Account Service, Revenue Service, Customs, Commerce and Trade among others. However, most of the civil servants who head government departments come from the Administrative Services and Office Management and Secretarial group. These civil servants are trained to lead conventional municipalities and ministries.

Arguably, and understandably, most of these staff appointments lack the expertise and technical skills to spearhead a technical department like the one dealing with e-Gov implementation. Technical departments are treated as any other ordinary government department and as a result often administrative officers are assigned roles into purely technical organisations without consideration of expertise. Yet, technical skills for positive outcomes of e-Gov initiatives are important, particularly as success of e-Gov initiatives is influenced by technical, managerial and leadership skills of senior management (Vasiu &

Vasiu 2006). Therefore, it is not surprising to see e-Gov projects fail to see the light of the day, in part because they lack clear direction from senior managers and leaders.

Another issue is that there is no separate cadre for technical professionals in Pakistan's civil service. Rather, the norm for technical organisations, whether related with e-Gov implementation or otherwise, is to be headed by non-professional bureaucratic staff or retired senior military officers. This is disadvantageous in many ways. First, these senior officials are appointed on a tenured basis, generally for three years. It is a double negative as they are not only alien to the department itself but also without the necessary background and skills for the job. Their appointments are at best ad-hoc and being unfamiliar with the organisation these appointees are unable to deliver the necessary leadership and long-term vision to the organisation. Second, such appointments cause loss of motivation among regular organisational members who are unable to get senior positions. This was seen as a key ingredient for failure and the ultimate disbandment of the Electronic Government Directorate (EGD) discussed earlier.

This issue appears to have now been recognised at the federal level, as the government has established a task force on civil service reforms and the necessary restructuring of departments. However, concrete outcomes are yet to be seen. A key issue to achieve desired outcomes in terms of e-Gov services is to appoint senior management with necessary skills and know-how to be able to deliver the necessary leadership.

6.4.3 Digital Divide(s)

The term digital divide coined by Norris (in 2001) identified a gap between what was described as the technology (and related IT skills) haves and have-nots. This concept has since evolved into a more complex idea that includes psychological access, where a user has little interest or even negative attitude towards computers, as well as the more common access to infrastructure and the necessary digital literacy skills (Antonio & Tuffley 2014). Related research has noted that a digital divide can be created by socio-economic differences, such as gender, age, poverty, financial resources, education, costs of technology or access to a working internet, as well as disadvantaged geographical locations (Okunola, Rowley & Johnson 2017). Notably, issues with the digital divide are increasingly prominent in developing countries (Singh, S 2017).

One consideration with the digital divide is the knowledge gap hypothesis that suggests people of a higher-economic status are advantaged by having earlier access to new sources of information. A related and important observation is the tendency to apply the term *access*

as a synonym for '*use*.' The effect is that important social issues such as opportunity and choice are unfortunately conflated with use. There is an evident gap noted between *access* and *actual use* that requires deeper investigation, particularly as an estimated four out of every five potential users live in developing countries. During discussions with e-Gov managers, factors that emerged to create a digital divide in Pakistan were categorised into three broad themes: socio-economic dynamics, infrastructure disparity and digital skills. These are discussed below.

6.4.3.1 Socio-Economic Dynamics

Pakistan is a low-middle income country and according to ADB (Asian Development Bank) data, 24.3 percent of the population lives below the poverty line (ADB 2021). Discussing key issues of e-Gov diffusion, interviewed participants noted poverty was a great challenge for e-Gov uptake in Pakistan. As participant 2 remarked, highlighting access and indirectly opportunity and choice-related concerns:

> *Use of e-Gov services require some pre-requisites like access to smart phone devices, availability of broadband internet etc., and these [perquisites] are not cheap. Vast majority of people in the country struggle to make ends meet, and when people are concerned about daily food and shelter needs, e-Gov is secondary.*

Although poverty is and remains a challenge for growth of e-Gov uptake in developing economies, e-Gov is also seen as an equaliser and a vehicle to reduce poverty by enhancing access to health, government financial services and markets (Saxena, K & Chauhan 2013). A pertinent example of this is the government's "*Ehsas emergency cash program*", which allows poverty-stricken citizens access to financial assistance through an ordinary text message. Similarly, to enhance the outreach of the government's digital services to the lowest income strata, the government is establishing five hundred digital hubs (GOP 2021). These hubs will improve the availability of e-Gov facilities to the poorest of people. These are some of key steps towards bridging the digital divide, however they need to be made available at a larger scale given the fact that almost one-quarter of the population lives below the poverty line. Therefore, paradoxically, while poverty poses a significant challenge to e-Gov uptake, e-Gov affords an opportunity to graduate people out of the poverty trap.

The digital divide emanates from socio-cultural dynamics of the country. Gender is a key factor, with more than half of the Pakistan's population being female. In a patriarchal society, this significant segment of the population has reduced opportunities for education, work, and ability to participate in the social-democratic process. Accordingly, this study

also noted that e-Gov uptake showed a substantial gender bias. This suggests government must direct policy efforts to reduce the social divide for improved uptake and e-participation of all citizens.

Gender inequalities are seen to exacerbate in developing countries by limited internet access, skills, and online rights. This is consistent with many empirical studies that show women in the developing world have significantly lower participation in e-Gov activities than men because of the digital divide. Arguably, this is a reflection of entrenched socio-cultural attitudes that can inhibit participation in technology activities in developing world (Antonio & Tuffley 2014). Noting that one of the 17 UN SDGs is gender equality (SDG #5), E-Gov is a powerful tool to support the general SDG related ambitions (UN 2016). Understandably, the Digital Pakistan Policy (DPP) seeks to drive the government's e-Gov agenda and address gender equality, but substantive actions to achieve policy goals have not yet been seen.

6.4.3.2 Infrastructure

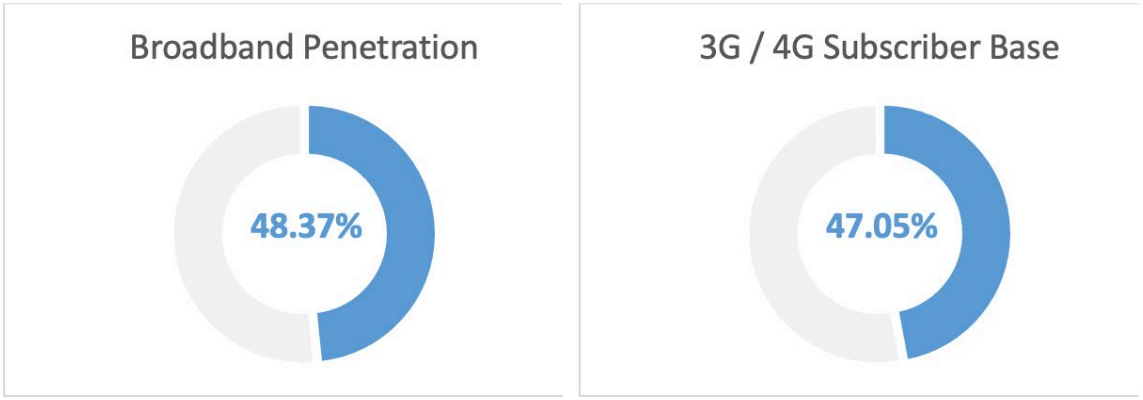
Another issue that can amplify the digital divide in Pakistan is a disproportionate access to infrastructure. This is especially true for rural communities that lack necessities such as consistent electricity. Moreover, especially during summer, six to eight hours of electricity outages is usual in these rural communities due to the surge in electricity demand. In the absence of basic infrastructure like electricity, expecting broadband internet to exist is a distant hope. As participant 4 noted:

> [The] *internet requires electricity and we have never seen its uninterrupted supply. UPS (Uninterrupted Power Supply) is a common household appliance in Pakistan, but batteries last only a couple of hours and in summer you may not have electricity for eight to twelve hours sometimes in rural communities. It's a far cry to expect provision of broadband services when basic infrastructure is nonexistent.*

Broadband internet is an indispensable element of e-Gov services and without it, such services cannot be imagined and as several interview participants mentioned, broadband internet is not widely available in rural communities. This is a key challenge for government's e-Gov efforts. According to the latest World Bank estimates, some 63 percent of Pakistan's population live in rural areas (World Bank). Objectives of e-Gov cannot be achieved equitably without the necessary (access to and affordability of) infrastructure to connect rural communities. Notwithstanding the phenomenal broadband penetration witnessed in the mobile sector with telecom de-regulation in 2003, at its core, e-Gov service

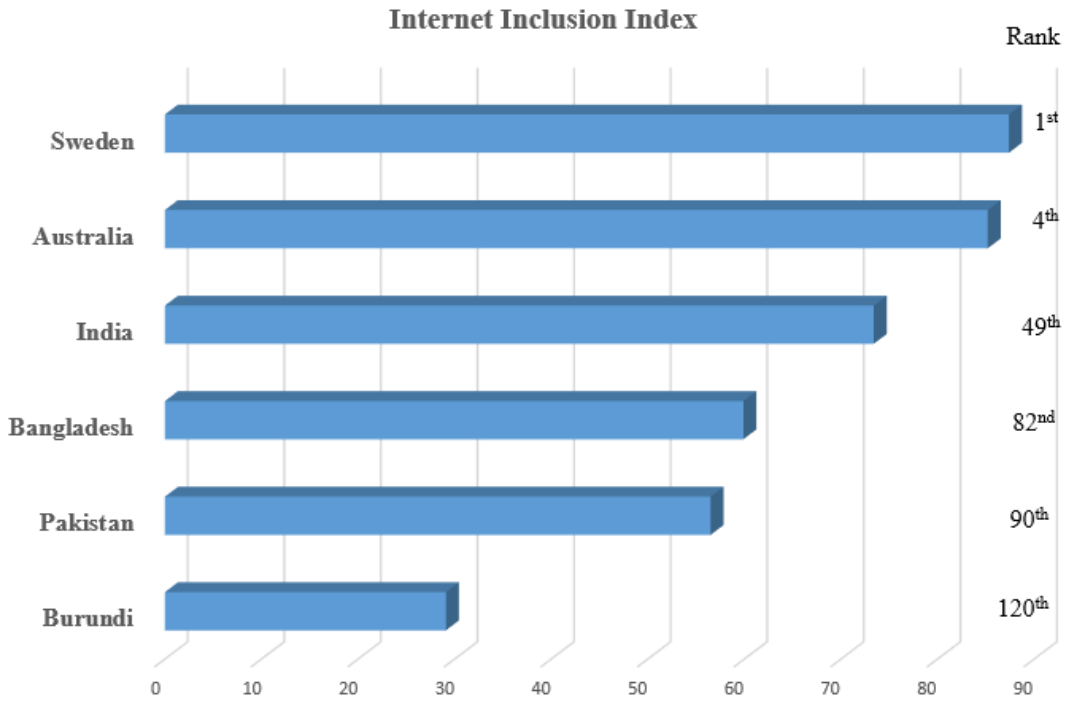
uptake is still relatively low. In fact, according to recent figures, more than half of the population is still without access to broadband services (see Figure 6.6). Broadband penetration includes fixed and mobile broadband, with almost all broadband subscribers being mobile broadband (3G/4G) users.

Figure 6.6: Broadband subscriber base in Pakistan (PTA 2021).



While most of Pakistan's population lives in rural areas, the telecommunication infrastructure is predominantly urban. There is a glaring rural-urban divide (Ingram 2021), which is a considerable challenge for Pakistan. This challenge in bridging the digital divide can be put into further perspective by noting a surprising fact – that even the US, an advanced country, and a leader in technological innovation, is battling with similar issue. To illustrate, a study by *Harvard Business Review* noted that the Kansas City school district has over seventy percent of children without access to internet at home (Chakravorti 2021). The challenge thus for Pakistan is monumental and is echoed in an Inclusive Internet Index (see Figure 6.7). This index benchmarks internet inclusion in 120 countries based on availability, affordability, relevance, and readiness; Pakistan is ranked 90th and is among the bottom quartile (Inclusive Internet Index 2020). Therefore, a necessary first step by the government is to direct time and considerable resources to improve internet inclusion and to reduce the digital divide. A key to bridging this divide is a shift in perspective from technocratic service delivery focus to a user-centric view. This matter is elaborated further in relation to PV discussed in terms of necessity-sufficiency logic (see section 6.5).

Figure 6.7: Pakistan in perspective (Inclusive Internet Index 2020).



6.4.3.3 Digital Literacy

The digital divide also manifests in terms of differences in digital literacy. This issue is compounded in rural communities, as the lack of infrastructure means people living there do not have the opportunity to develop the skills to use e-Gov services. Arguably, digital literacy is a circular issue, with limited uptake reflecting low literacy that in turn reflects an absence of opportunity that also influences attitudes towards uptake (Antonio & Tuffley 2014). As participant 5 commented:

> *Even if you have telecommunication and ICT infrastructure spread across the country, people don't have necessary skills to make use of that infrastructure due to their inability to use it. To achieve the tangible benefits of e-Gov initiatives, it is important to lift the digital literacy skills of the population.*

Investing in people's skills is a (necessary) prerequisite for widespread uptake of e-Gov, but so too is infrastructure. Studies in other emerging economies like Brazil show similar concerns over the need to improve infrastructure and the citizens' lack of perceived need to use these services due to limited skills to use these services (Marcus 2015). The government needs to respond with policies aimed to improve peoples' digital skills. The Digital Pakistan Policy (Government of Pakistan 2018a) does attempt to address this issue, but only partially. As such, the policy takes a top-down approach by emphasising on higher level digital skills like freelancing and developing programs for IT startups. Arguably, the real need for

improved uptake is to take a bottom-up approach at targeted issues, such as digital skills training for a rural populace and for females, and improved access to infrastructure. A summary of issues and proposed solutions discussed above is shown in Table 6.1 below.

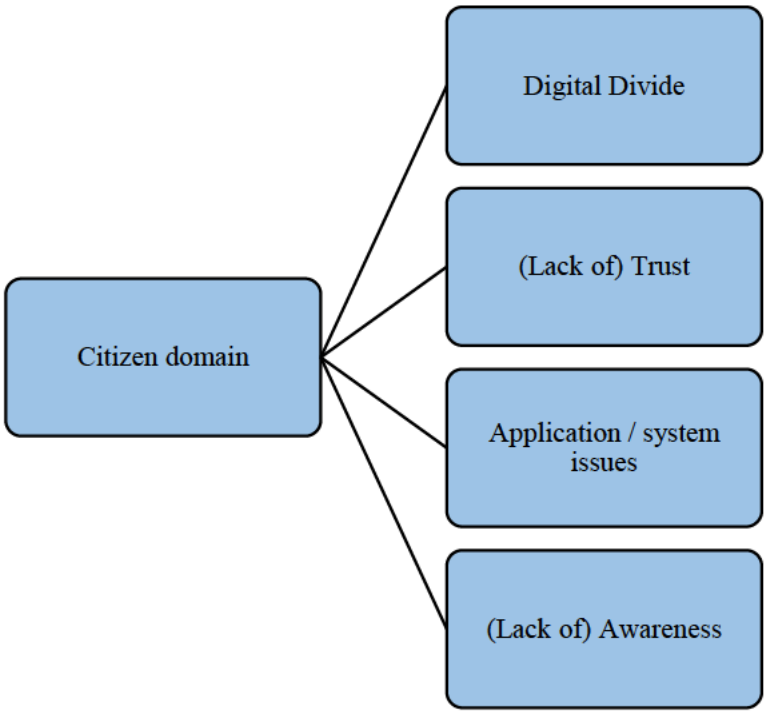
Table 6.1: Summary of the key issues

Domain	Issues identified	Proposed solution
Enabling Environment	Legal – Regulatory / Policy inconsistencies	Effective legislation Centralised body to oversee e-Gov implementation
Structural	Bureaucratic Resistance	Leadership support
	Resource constraint	Innovative project implementation strategies (IaaS, PaaS, SaaS)
	Leadership (Appointment of administrative officers as senior leaders)	Leadership pathway / creation of technical cadre
Digital Divide	Socio-economic dynamics	Gender equity, digital hubs
	Infrastructure	Extend infrastructure into regional areas
	Digital literacy	Digital skills program (targeted)

6.5 Citizen Domain

E-Gov services are designed for citizens. Thus, it is logically important to take stock of the experiences and the challenges faced by them when seeking to use these services and to assess the perceptions of satisfaction and related public value derived from using these services. This focus will not only improve government awareness of user expectations and demands, but it is also important as it is a key source of competitive advantage (Zauner, Koller & Hatak 2015). Research supports this view, showing that uptake of e-Gov services is largely influenced by a citizen's evaluation of services being offered (Pérez-Morote, Pontones-Rosa & Núñez-Chicharro 2020). To address this consideration, qualitative data based on open-ended questions were invited from citizens on their perceptions of value of e-Gov services and implementation challenges. Of the 380 total responses received, 182 included QUAL responses. Based on this data, four themes were identified: a digital divide, lack of trust, application / system issues, and lack of awareness (Figure 6.8).

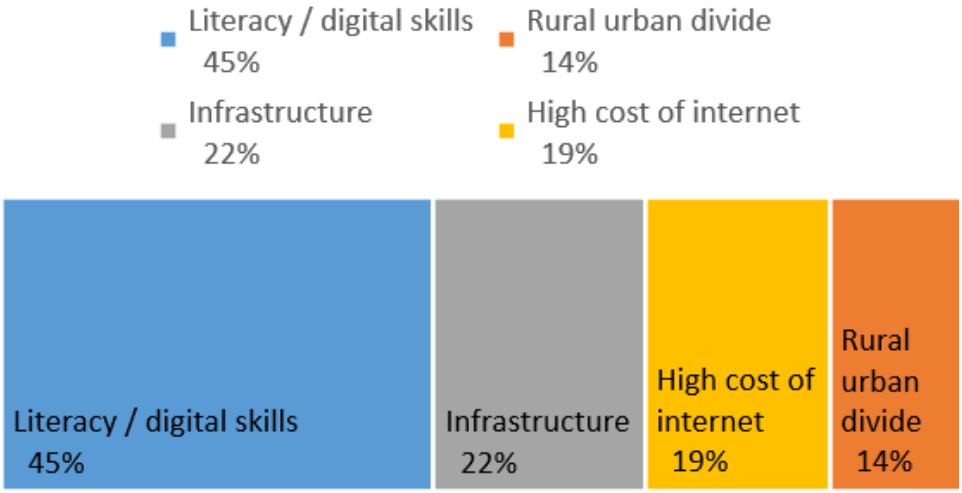
Figure 6.8: Key e-Gov issues – Citizen Domain



6.5.1 Digital Divide (reprised)

The concept of a digital divide emerged as a key issue from managerial data. Similarly, data sourced from citizens is consistent with earlier observations, but also adds a heightened understanding of the construct, for example by amplifying a division between rural-urban populations. The broad issues identified here are depicted in proportional terms in Figure 6.9. Literacy in general and digital literacy were the most common issues raised by some 45 percent of the survey respondents. The overall literacy rate for the adult population in Pakistan stands at 59.1 percent; for females, it is somewhat lower at 46.4 percent (World Bank 2021c).

Figure 6.9: Citizen Perspective of socio-economic challenges

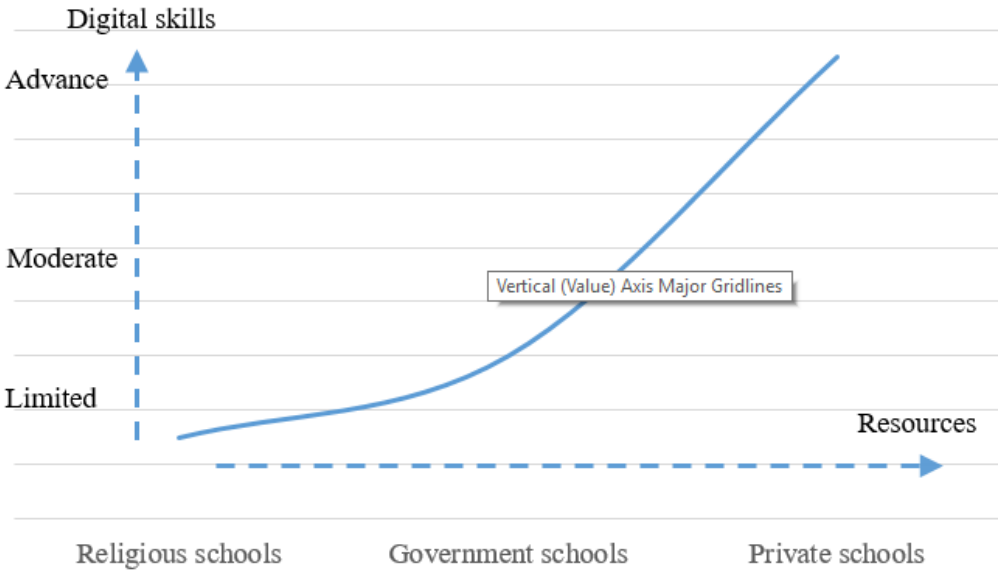


Most respondents considered literacy and digital literacy as the primary challenge in adopting e-Gov services. Some also highlighted the structural inequalities in Pakistan's education system, as well as general affordability of ICT and the lack of basic infrastructure. As one of the respondents mentioned:

> *Education is the biggest challenge for Pakistan. Before coming to power, it was in the government's manifesto to introduce a uniform education system, however, more than halfway into their government, no tangible steps have been taken in this regard.*

Regarding education, there are three parallel education systems in the country: private schools, government schools and religious schools or *Madrassas*. People with a medium-to-high socio-economic status are typically able to access private schools, while government (State) run schools fulfill the education needs of the average or less than average income earner. Given that education spending is relatively constrained, these state-funded schools have limited access to resources, while religious schools are not mainstream educational institutions at the other extreme: run as charities, with technical facilities and modern education practices virtually non-existent. Reflecting the varying education systems and available resources, as depicted in Figure 6.10, understandably the general literacy and in particular the digital literacy of young people graduating from the respective schools varies considerably.

Figure 6.10: Education systems and digital literacy (illustrated)



Although the constitution of Pakistan mandates universal primary education for all school-aged children, this is an elusive goal. According to a recent UNICEF report, Pakistan has the world's second highest number of children who do not go to school (UNICEF 2021). State education spending is 2.9 percent of GDP, which is far below regional (South Asia 3.4 percent) and world averages (4.52 percent) (World Bank 2021b). It is clear the government needs to invest in the education sector to reduce structural inequalities produced by the different education systems. Aside from improved digital infrastructure for government-run schools, religious schools need to be brought into the curricular mainstream, to improve general literacy rates and build necessary digital literacy across the population.

Another issue emphasised by almost 22 percent of survey respondents was a lack of telecommunication infrastructure. ICT and telecommunication are the backbone of e-Gov services and is fundamental for widespread uptake of e-Gov services. However, a huge inequality in infrastructure is reported and especially in rural communities. Major cities have state-of-the-art wireless 4G services but rural communities struggle to even get basic voice communication services. Affordability of internet services was another issue reported by an overwhelming majority of survey respondents. Being a low-middle income country, most people in Pakistan cannot afford broadband services which are a prerequisite for e-Gov service uptake. This trend is consistent with much of the literature on the digital divide (Reddick et al. 2020; Weiss et al. 2015).

6.5.2 Trust and Privacy

A second theme emerging in the citizen data concerned the lack of data protection and privacy laws (Aleem et al. 2021). This deficit adversely impacts trust and so uptake of e-Gov services. Lack of trust in the government is a major barrier to uptake of e-Gov services for around 20 percent of respondents. People do not trust that information they share with the government is in safe hands. As one respondent put it: "*many people are reluctant to share their information electronically, possibly due to privacy and security concerns."*

Compounding this trust gap is the prevalence of identity theft and cybercrimes that have been reported in Pakistan in recent times (Malik & Islam 2019). People's identities have been stolen to issue SIM cards that have been subsequently used in illicit activities. Such incidents have shaken the trust of people in online services and people are also generally skeptical of sharing personal details through online platforms. Similarly cybercrime and hacking are a significant challenge (Shad 2019).

To thwart such activities the government has established a dedicated agency to mitigate cyber threats – the National Centre for Cyber Crime (NR3C). However, there is still a lot that is required to be done to restore peoples' trust in online services. In total, only fourteen cybercrime convictions were made in the last eight years (Akhlaq 2021), due to different legal challenges. As well, many of these fourteen convictions were motivated more by political or religious reasons and so have had little effect on public trust-building.

6.5.3 Application / System Issues

A third theme emerging in the citizen data concerned system-related issues that were constantly reported by survey respondents. Common issues were complicated user interfaces, poorly developed applications, and low reliability of e-Gov applications. As one user put it:

> *Servers running e-Gov service are unable to handle a large amount of people accessing it. For example, during income tax return season the IRIS portal constantly keeps logging you out for no apparent reason*.

Another highlighted software issues in e-Gov applications:

> *I use [the] Islamabad City app to pay [a] token tax. [The] app kept prompting me to update, however, on Playstore there was no update available. Even the reinstallation didn't work, and it kept crashing.*

Similarly, tedious issues like constant password errors and non-receipt of verification codes were reported by respondents. These issues can be avoided at the development stage by proper testing and debugging protocols, if there was an effective process to capture and support citizen satisfaction before launching any e-Gov service. Another related issue raised by a considerable number of people was the lack of responsiveness by government agencies to user feedback. As an example, the government launched an app, the Pakistan Citizen Portal (PCP), which was dubbed a step towards participatory governance. It was intended to allow citizens access to all government departments under one umbrella. Citizens can also use the application to lodge complaints or grievances with any government department. However, recurrent feedback was that complaints lodged through the app are often closed by the system without being resolved. An overwhelming majority of respondents reported that user feedback was often simply ignored.

To make feedback implementation more accountable and transparent, there was an interesting argument made in survey responses for a public review and rating system. This process was seen as a mechanism to not only improve quality of service, but also induce greater accountability by government agencies. Arguably, such a review and rating system is also important to build trust between citizens and the government. Private sector technology-based companies such as Airbnb rely on such review and rating systems in building trust between services providers and clients; and is termed as *trust by design* (Gebbia 2016). A similar well-designed e-Gov reputation system, where citizens can rate and provide feedback on government services and where they can share their individual experiences can help build trust between citizens' and the government.

6.5.4 Lack of Awareness

A final theme emerging in the citizen data concerned service awareness; around 20 percent of respondents noted that people are not aware what e-Gov services were available to citizens'. They remarked that the government needed to 'spread the word' about digital initiatives launched by them. As one responded stated:

> *[The] Islamabad City app is a good application, which allows you to pay various civic fees, but I was not aware of it and only came to know about it from a friend.*

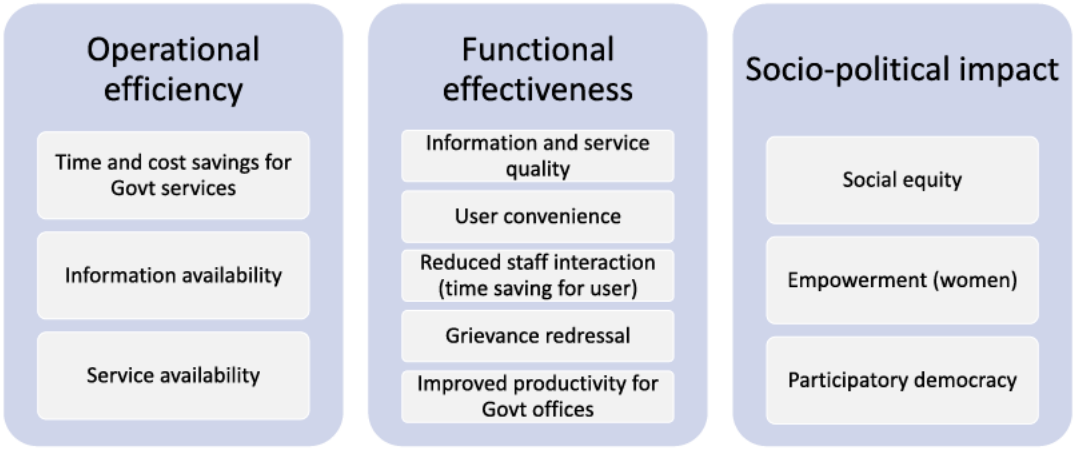
Similarly, other responses show that many e-Gov initiatives are not noticed or do not reach the intended population. This is largely due to a lack of marketing and of awareness campaigns and it is important that government formulate a targeted awareness strategy so that these service are properly marketed to intended audiences.

6.6 Measuring What Matters: e-Gov PV Impact

Public value as a concept first emerged in a seminal study by Moore (1995). The concept expresses an emerging approach to assessing e-Gov uptake and its impact from the public's perspective. PV is seen as something replacing earlier performance measuring practices that were often criticised for their primary emphasis on cost efficiencies (Cordella & Bonina 2012). Public value is the value or significance recognised by citizens for their experience of public service and government policies (Moore 1995). It defines a new way of evaluating government services in terms of efficiency, effectiveness and social values (Bryson, Crosby & Bloomberg 2014; Stoker 2006). This ability is described as an important shift in focus from service production to service delivery when meeting citizens' expectations (Panagiotopoulos, Klievink & Cordella 2019).

One of the objectives of adopting a qualitative approach and subsequent thematic analysis to supplement the earlier QUANT examination of adoption, was to examine citizen perceptions of PV in relation to e-Gov services. In this study, overlapping viewpoints by citizen (user) and practitioner (manager) were identified. Figure 6.11 depicts the three main themes and associated sub-themes. The three broad themes reported in relation to e-Gov initiatives have an overlapping and complementary logic that connects across the respective government/ manager and citizen/ user viewpoints.

Figure 6.11: E-Gov PV impact categories



Theme 1, operational efficiency, is categorised as a managerial view that, unsurprisingly, tends to stress emphasise the provision of service and impact is typically expressed in terms of efficiency of use (related to cost and process savings). The sub-themes highlighted include time saving, grievance processes, as well as information quality and service reliability. This operationally focused theme may, but to a lesser degree, also address

effectiveness but is usually assessed in terms of costs and enabling greater productivity of staff in government offices. A second theme, functional effectiveness, is in contrast a user-oriented view and it can be described as extending the impact from use to user satisfaction. Impact is expressed in terms of effectiveness from a user's perspective and measured by information and service quality, as well as convenience and time saving outcomes. A third theme, socio-political impact was also identified by users and it extends the PV impact into the cognitive and social domain, highlighting aspects such as social equity, empowerment for women and greater participatory democracy. Each of these three PV impact thematic categories are discussed in the following sub-sections.

6.6.1 Operational Efficiency

Time and cost efficiencies are the most significant operational impacts created by e-Gov services. While e-Gov enables citizens to access services, the priority is not convenience from a managerial perspective, but cost in terms of time and resources. As a manager (participant 3) noted:

> *We have now launched transactional e-Gov services in many departments. Like for example, because of recent initiative taken by Securities and Exchange Commission of Pakistan, citizens can register their business online, if they have provided all relevant information. This saves a lot of time not only for citizens, but also for us as many processes are now automated.*

Public service managers also value e-Gov, but more as an operational means to increase efficiency in information and services delivery to the masses online, in lieu of physical visits as was usually the case, e-Gov services can save time for citizens and reduce staff resources and processing time for government agencies. The key consideration of government functionaries appears to be cost and time savings by implementing these services. Another e-Gov service benefit is service availability, with management aware that users are often not helped and even greatly inconvenienced by visits to offices. As participant 7 noted:

> *It is a common occurrence that when people visit government offices, they are often shuttled from one office to another and often get conflicting information from different people. Sometimes they are even made to visit multiple times to get basic information about a service. However, e-Gov services have provided ease to people to get information about services they require at their fingertips.*

6.6.2 Functional Effectiveness

An effective e-Gov service enables citizen-centric policies and provides high quality public services (Duho, Amankwa & Musah-Surugu 2020). These characteristics of value in increased functional effectiveness are abstracted across three *user-centric* sub-themes, information and service quality, user convenience that includes the ability to avoid the need for personal interaction, and grievance redressal, as well as a fourth, *manager-centric* theme, improved productivity by government officials. E-Gov enables citizens to interact with the government in a far more convenient, less costly way. From a user perspective, as survey respondents noted, they no longer needed to physically travel to offices and wait in long queues to do menial tasks. As one of the survey respondents noted:

> *Accessing government services impacts our daily life [negatively]; most of the government departments have their windows and counters crowded and we have to wait for a long time when we need their services. However, now [with e-Gov] we can pay for government fees and taxes online, which is very convenient.*

Information and service quality are key features of e-Gov services valued by citizens. Value is manifested by the provision of current, accurate and round-the-clock availability of information for citizens via the various e-Gov platforms. In contrast to public service managers who appear to value e-Gov more for the operational efficiency in delivering information and services to the masses online, citizens value effectiveness in terms of ready on-line access to services as it not only saves them time and money, but it avoids needing to get in long queues or make multiple visits to offices. It is valued further if it enables better quality (reliable information) of service. Managers are aware of competing priorities, and the challenge of ensuring up-to-date and relevant information on government portals is repeatedly highlighted. As interviewee 1 noted:

> *Format and layout of many e-Gov applications is not user friendly. Likewise, web portals often [have] outdated information listed. Many times these websites are swamped by unnecessary information like organograms [structure of departments] and political messages having no relevance to the service being provided. To attain maximum value, it is important that organizations have dedicated IT department tasked with regularly updating e-Gov application and services, so that the most relevant information is available to citizens.*

Another example of e-Gov capability valued by citizens that is acknowledged by public sector managers was getting rid of time-wasting queuing and fruitless interactions with government officials. As one of the interview participants mentioned:

> *In Pakistan interacting with most of government departments is not easy as it is very difficult to gain time from these officers/ authorities. The e-Gov services can easily solve the aforesaid issue thus saving [us] time and cost.*

E-Gov services, for the ordinary citizen, enable convenient access to government authorities. This is a functionally significant and highly effective capability improvement for users. Besides convenience, users lauded innovative and highly productive solutions to solve ad-hoc problems and redress grievances using technology to enhance government effectiveness. Another example of improved government effectiveness and productivity as noted by participant 3 was the Punjab IT Board (PITB) assisting the health department in tracking and controlling a dengue fever epidemic in Lahore. PITB developed an app that was used by surveillance teams to geo-tag locations where dengue-spreading mosquito larvae were found. Based on location data and using key variables contributing to the growth of the larvae, like temperature and humidity, problematic locations were identified and the government was able to effectively control the epidemic (PITB 2021).

6.6.3 Socio-political Impact

Socio-political impacts are the third broad category of PV identified in the QUAL data. It is manifested by three interlinked sub-themes, namely social equity, empowerment of women and participatory democracy. As recent research has noted, extreme gender inequalities exist in terms of internet access, digital skills and in online rights in many developing countries. Pakistan is a male dominated patriarchal culture. Consequently, social inequality, in particular gender inequality, are built into the fabric of the society. These inequalities are a major roadblock for women's empowerment and participation in a digital economy. However, e-Gov is a pathway to sidestepping this by enabling women to speak freely and privately. As participant 4, the female manager from a public sector organisation stated, there is a great sense of empowerment afforded to women by greater access and use of e-Gov services:

> *There have been laws and regulations, but e-Gov has enabled us to put those laws in practice in a very user friendly manner. For example, in our society women consider it a taboo to talk about workplace harassment issues and go to relevant*

government bodies to register a complaint. Now, anyone can register a complaint by filling just one-page online form and an inquiry will be initiated.

The comment above illustrates a significant social barrier and a pathway for change in a complex, conservative and sometimes authoritarian social environment. For women and many other disadvantaged groups in the community, non-conflictual complaint and change processes to address issues in the socio-economic environment are greatly helped by e-Gov services. Equal access to technology is arguably a target for major policy effort, particularly as the evidence is that further technological change will only widen the existing gender divide in society.

The social equity benefits for all citizens from access to information via e-Gov services is a key value recognised by survey respondents. As one of them noted:

[The] DC (Deputy Commissioner) Islamabad has a Twitter account, and anybody be it be rich or poor or belong to powerful or weak segment of the society, if he has access to internet, he can message DC on a social media platform and he duly responds. Now people don't need big connections to get menial work done.

Understandably, with benefits of e-Gov services and the associated social equity benefits (gender, poverty, justice, education) for disadvantaged segments of society, there will also be challenges. For example, people need access to technology or else they risk being left behind. Aside from access, there are also require adequate digital skills, access to infrastructure, particularly in rural areas, and affordable internet services. The issues have been discussed in detail in earlier section 6.3.3.

Another sub-theme identified in the study is the potential for e-Gov to enable participatory democracy. It can occur through having a citizen's feedback / grievance redressal system. Effective grievance redressal mechanisms are recognised as a key indicator of effective citizen participation (Das, Panda & Misra 2020). It is highly valued by users of e-Gov, as they not only enable participation, but they also can enhance accountability for government services. The Pakistan Citizen Portal (PCP) is one such portal that enables citizens to lodge complaints against the government, and as one of the participants noted:

PCP is as important initiative undertaken by government, as it has brought transparency into the system. Citizens feel empowered as they have someone to access if their issues are not resolved, government officers who are dealing with the citizen are more diligent because they know that every common citizen can lodge a

complaint through the online grievance redressal system. Equally, public sector performance has greater visibility and feedback mechanism. It's a win-win for all.

As another participant expressed:

[The] Pakistan Citizen Portal is a great step by the government to have citizen engagement. I lodged a complaint via the system some time ago and it is now thankfully resolved. Although they may take some time to resolve, ultimately you get to hear about an outcome.

Aside from a responsive grievance redressal system, the capacity to participate in policy formulation is also an important element in perceptions of value for citizens (Brewer 2007). In discussing citizen participation in government policy formulation, participant 2 gave an example of a consultative process:

Current telecom regulatory regime is very liberal and consultative in nature, which has enabled the exponential growth of the sector. Before issuing any new guideline PTA (Pakistan Telecom Authority) undertakes an extensive public consultation process and invites feedback from all interested stakeholders.

Such a consultative process that included a public feedback process before the promulgation of new rules or regulations is important for public trust, and it is an important benefit of e-Gov systems. This consultative process is prevalent in regulatory authorities such as Pakistan Telecom Authority, Pakistan Electronic Media Regulatory Authority. However, a broader public discourse based on citizen participation in policy and legislature is still deficient. According to a recent UN e-participation report, a true participatory e-Gov system is one where the government engages citizens in the wider decision-making and legislative process (Le Blanc 2020). As such, it is reasonable to say the present consultative process in some regulatory authorities is a step in the right direction, but the need is to expand this public consultation to wider government legislation and decision making process.

E-voting is another feature of participatory democracy (Alomari 2016). Various governments have attempted to adopt an e-voting system, but as the study by Alomari (2016) notes, there is widespread mistrust. As one government manager, participant 6, elaborated:

I think our people mostly use e-Gov services to just visit government websites. They are not yet ready to trust e-voting. Pakistan has a lot of history of political

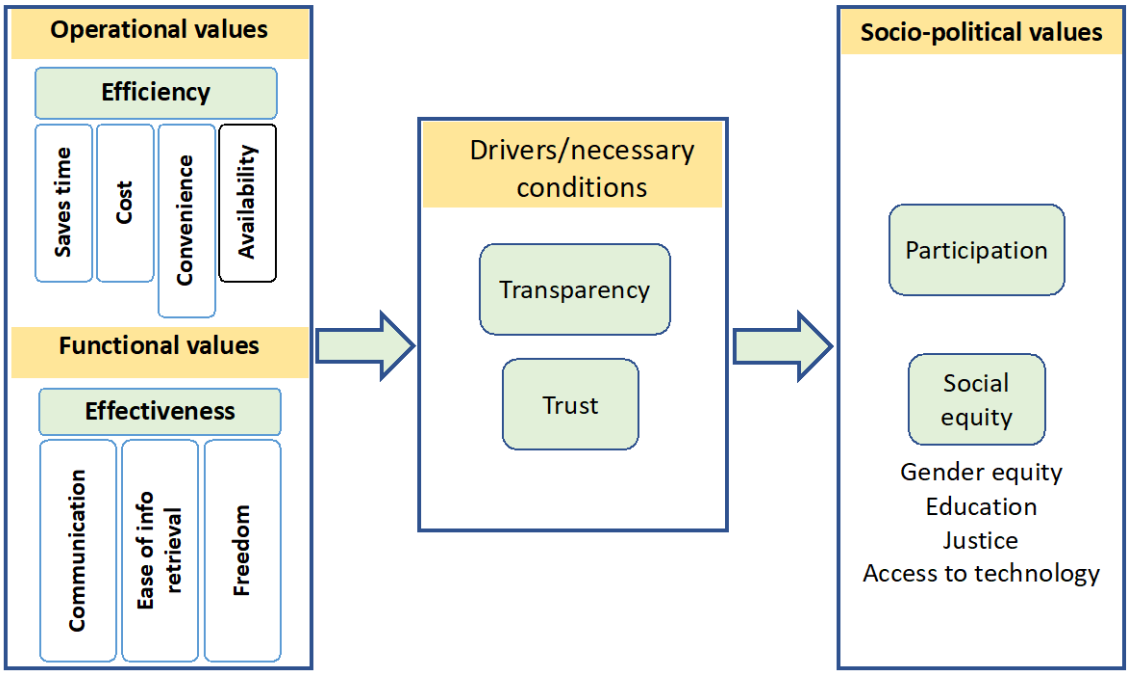
engineering and people think that e-voting can be used to manipulate election results. Even if it's mandated, logistically it's a difficult task. You must set this up not only in big cities but also in far-flung areas. How might these machines work when many rural areas don't have either mobile reception or electricity?

Enabling participatory democracy is one of the highest values derived from e-Gov. However, there are practical issues in implementation. It will require legislative changes that are yet not in place. Evidently, from the earlier discussion it is mostly operational and functional level values that are realised by e-Gov initiatives. Advancing from efficiency and effectiveness to more transformative change involves complex socio-political processes and preconditions that are discussed below.

6.6.4 Drivers of E-Gov Socio-political Impact

The drivers of e-Gov impact are largely but not exclusively external conditions that facilitate the advance of e-Gov services from operational efficiency to more complex socio-political impacts. These impact drivers help to create what can be described as first-order values of efficiency and effectiveness, as well as higher-order values associated with democratic participation (Schmidthuber et al. 2019) – see Figure 6.12. Citizen participation is seen as the pinnacle of e-Gov value (Masinde & Mkhonto 2019). These higher-order values cannot, however, be achieved until there are some fundamental conditions present. Trust and transparency are two such conditions that are needed to enable widespread e-Gov uptake. Beyond practical considerations of access and affordability, it is these necessary conditions that are crucial to e-Gov services progressing from lower-order benefits of operational value to higher-order socio-political impact.

Figure 6.12: E-Gov impact framework



6.6.4.1 Trust

Trust in government services is of fundamental importance to generate higher-order socio-political benefits. Arguably, having trust in the government encourages citizens to engage more readily with its services as the perceived risk in using these services is reduced. Trust is abstracted as both trust in government and trust in technology – the two elements are connected. Analysis of qualitative data suggests perceptions of trust in the government are relatively low. Users reveal they are not comfortable sharing their personal information because they are apprehensive that corrupt elements in the agencies may get hold of their personal data and misuse it. As participant 1, noted:

> *Every now and then we hear news of data breaches into government's system. How can people be confident to share their details on systems that are not secure?*

As such, trust in the government requires positive perceptions of integrity of its services and systems. It also means that officials interact with citizens in an honest manner and ensure that fraudulent transactions do not happen (Bélanger & Carter 2008). Any breach of citizen trust leads them being hesitant in sharing personal details with the government and so the ultimate objective of higher-level benefits does not materialise.

The second element of trust evident in the discussions was a lack of trust in technology. Contrary to face-to-face interactions when accessing services, e-Gov is unique due to its impersonal nature, which on top of privacy concerns and cybersecurity threats has made it

difficult for people to establish trust in e-Gov technology (Li, W 2021). Unsurprisingly, uptake of e-Gov services is not helped by security and privacy concerns. As one of the survey respondents stated:

> *People in general are not confident enough to start using these e-Gov services as they don't trust giving away vital information over the internet in Pakistan.*

These security and privacy concerns are compounded by a sense of vulnerability of technical infrastructure. An example of such an infrastructure is Public Key Infrastructure (PKI) that uses a trusted third party known as Certificate Authority (CA) to verify identities of people and machines to securely log into systems (Singla & Bertino 2018). As participant 5, elaborated:

> *HEC (Higher Education Commission) had a big ransomware attack some time ago. When you digitize a service, it is important that trust services are added, by that I mean public key or PKI type of service. Government has not invested in establishing a PKI set-up under which a centralized authority issues security certificates to all these applications, machines or humans that protect the integrity of the service.*

Due to this non-availability of IT security apparatus, the integrity of public data is regularly breached, contributing to a lack of trust in using e-Gov services. As well, some question the government's expertise to protect citizens' information from hacking and malicious attacks. In fact a report by the Federal Investigation Agency revealed that almost all banks in Pakistan have been subject to hacking attacks and have lost money in many instances (Syed, Khaver & Yasin 2019). Such incidents have massively eroded public trust in general online services.

Based on the above discussion, trust is a complex consideration, and it plays a fundamental role in people's uptake and continued use of e-Gov services. It is a highly valued attribute by people and public practitioners alike. Trust and associated feature of transparency together foster citizen participation and they promote e-democracy (Dorothea 2013), and also act as a bridge between lower level efficiency and effectiveness benefits and the high level public participatory benefits from effective and trusted e-Gov services (Santa, MacDonald & Ferrer 2019).

6.6.4.2 Transparency

Having greater transparency in e-Gov service provision is a key value highlighted in this study. It is enabled through provision of equitable and open access to government

information and the presence of a trail of records. Participants highly valued the ability to access government information and ease of approach to government authorities as important values created by e-Gov. Further, some participants valued the right to access information through e-Gov services. As one of the survey respondents remarked:

> *E-Gov services have allowed [users] to take full advantage of right to information laws. The process to request a government information is very easy and transparent and now a greater number of people can make use of these services.*

Another respondent, highlighting the complexities of getting progress in a bureaucracy that expect tips and gratuities, contended:

> *You no longer need personal contacts or [need to] grease peoples palms to get your things done. E-Gov services have made a huge impact on people's lives in terms of greater transparency.*

Implementing a truly transparent government service is a difficult feat, but e-Gov has made this goal more viable through the use of technology and by open access (Dorothea 2013). Another step towards greater transparency is for people to have greater visibility of their service requests. To this end, e-Gov not only keeps track of service requests but also relay progress to citizens. As interview participant 6 mentioned:

> *When a citizen lodges a complaint on Citizen Portal, he/she is given immediate confirmation of receipt of the complaint and then on every step in the complaint resolution process regular status updates are provided to the citizen, till the time an outcome is finalized.*

This transparency in the shape of greater visibility of the status of and progress in people's service requests and complaints is highly valued by citizens. Conversely, some participants offered a guarded opinion on service integrity, noting that sometimes the status of complaint was updated as resolved in the system, but it was not actually resolved by a person. This issue may well be a customer satisfaction rather than transparency issue, as users sometimes may not be satisfied with the outcome of their complaints. Overall, most participants highly valued the ability to track the physical progress of their requests.

6.7 Enabling and Constraining Factors to E-Gov Uptake and PV (RO2.2)

Readers will recall RO 2.2 is: to *identify enabling and constraining factors that influence citizen adoption of e-Gov and creation of PV in an emerging economy like Pakistan*. There

is an intentional refocus in language on **uptake** in the section heading, rather than the earlier and more traditional use of adoption. Adoption, perhaps reflecting earlier concerns linked to an emerging capability, appears to bias a techno-centric approach and a focus cost and resource efficiencies. Uptake in contrast helps shift the attention away from technology adoption to user uptake, user satisfaction and functional effectiveness. Uptake also invites a clearer and richer consideration of PV in terms of public participation, e-democracy, and e-voting.

To examine factors that enable and/or constrain the process of e-Gov uptake and creation of PV in Pakistan, this study used a force-field-analysis or FFA. This is a technique to understand change and support decision-making (Coghlan & Brydon-Miller 2014). Based on the many factors identified through a FFA, a tangible action plan is able to be made by, in this case, government representatives in order to steer necessary change (Toves, Graf & Gould 2016). Results of both QUANT and QUAL analysis inform the FFA process that cumulatively identified a supply-side bias and a top-down managerial view to driving forces in e-Gov uptake and PV creation. In contrast, a bottom-up, demand-side or citizen-centric view appears to portray the primary restraining forces to successful adoption and PV.

6.7.1 Force Field Analysis (FFA)

Originally proposed by Kurt Lewin, a FFA enables a researcher to examine forces that drive and/or constrain a desired action such as a government policy decision (Heeks 2003b). The main idea behind a FFA is that an equilibrium or status quo is typically evident in organisations. The status quo represents a balance between the multiple forces that push in both directions and which in effect compete with each other to drive or impede desired change (Yang, Y et al. 2021). The utility of the tool is that it helps first identify and place forces on either side of the central equilibrium. To enable desired change, the principle is to focus on one or two easy to shift resisting forces to alter the prevailing equilibrium. This change, by implementing selected simple-to-achieve actions on the resisting side will allow the driving forces to outweigh resisting forces and to push the collective towards some desired change. Arguably, any small successes will in turn build momentum for greater change.

In an FFA it is important to capture both enabling and constraining forces in a group effort that builds an overall collective understanding of the issues involved, before enabling change by simply removing some obstacles. In change management process terms, the FFA

helps build a guiding coalition, develop a shared vision, and empower employees for action (per Kotter's 8-step change model). Enabling and constraining forces were largely categorised in terms of managerial supply and user demand considerations. To explain the two terms, since e-Gov is provided by the government, this is referred to as the supply side (and drives adoption), while e-Gov user uptake is termed the demand-side. Supply and demand side considerations are applied to both enabling (driving) and constraining (resisting) forces, with some forces in-fact appearing on both sides of the FFA equation. Costs, for example, are a driving force viewed from the perspective of the provider – arguably, a primary supply-side consideration over reducing the cost-of-service provision or achieving greater resource productivity. Equally, costs can be a resisting or constraining force, from the demand-side. Technology, for example, may be too expensive or the internet too costly for users.

To examine and understand e-Gov uptake and PV creation in Pakistan, enabling and constraining forces were first identified. This process was completed as a general brainstorm of factors, without apportioning value or relative importance to any consideration. Once this process was completed, the next step was to focus only on factors resisting or constraining, as logically driving forces exist usually beyond the organisation and are the impetus for change; as such, they require no effort. To change the equilibrium, it is only necessary to initiate change by slightly adjusting what can be easy-to-shift resistant forces. These forces in turn help create short-term wins and strengthens change by anchoring it in the culture. Consistent with this methodology, the FFA is completed by identifying 2 or 3 action areas that are placed centrally at the bottom of the image in Figure 6.13.

6.7.2 Driving or Enabling Forces

6.7.2.1 Supply-side / Policy drivers

A key supply-side force that drives e-Gov use is policy. A primary policy driver is Digital Pakistan Policy (DPP), which outlines the government's vision and sets goals for digital transformation and acts as a key driver for uptake of e-Gov and PV creation in Pakistan. Crucially, policy instruments not only identify current problems, but also act as a tool to guide and benchmark the government's reform agenda (OECD 2020). Effective policy evidentially has a significant impact on uptake of e-Gov (Melin & Wihlborg 2018).

While the DPP drives e-Gov transformation in Pakistan, there is also impetus from different international organisations like the UN, World Bank and Asian Development Bank (ADB) that give strategic direction to the government's domestic e-Gov policies. For example,

many of the DPP's objectives support the UN's Sustainable Development Goals (SDGs). Specifically, the DPP aims to support UN SDGs 1, 4, 5, 8 and 10 that are, respectively: no poverty, quality education, gender equality, decent work and economic growth and reduced inequalities. According to a 2016 UN survey, e-Gov can be used as a vehicle to achieve these goals (UN 2016). Similarly, other international organizations such as the World Bank and Asian Development Bank encourage institutional capacity building through dedicated e-Gov programs (Kuldosheva 2021). In Pakistan, DPP manifests the government's resolve to achieve the objectives of e-Gov uptake and PV creation, referring to the international policy objectives of international agencies. E-Gov domestic and international policy therefore acts as a key enabler (driver) for uptake and PV creation in Pakistan.

6.7.2.2 Supply-side / Infrastructure

E-Gov is strongly enabled by ICT infrastructure. Benefits of e-Gov cannot be realized without the underlying infrastructure, as ICT infrastructure is foundation on which e-Gov is built. In Pakistan, urban areas where ICT and telecommunications infrastructure is available have witnessed the strong uptake of e-Gov, on the contrary rural communicates lack ICT infrastructure and tend to lag behind their city counterparts. Therefore, infrastructure is seen as one of the key enablers for e-Gov uptake. The value of having ICT infrastructure, especially in rural communities, was stressed time and again in both interviews and the survey responses. These findings are consistent with literature on e-Gov services uptake (Masinde & Mkhonto 2019; Yera et al. 2020).

6.7.2.3 Supply-side / Managerial Accountability

Another enabling force for uptake of e-Gov is the need for accountability, which appears to be the single biggest challenge for governments. Managers in the public sector are arguably accountable to the public they serve and the concerned agencies for the decisions they make as these two forces help to achieve good governance (Khotami 2017). Governments in developed and developing countries alike have aspired to enhance accountability of their public service agencies. In recent times, e-Gov has been viewed as a powerful tool to achieve this aim and operationalise the principles of accountability with better monitoring, openness and transparency (Al-Shbail & Aman 2018; Lindquist & Huse 2017). From a managerial perspective, senior leadership viewed accountability as a key driver for uptake of e-Gov in Pakistan.

6.7.2.4 Supply-side / Productivity Pressures

According to the OECD, productivity is often seen in terms of efficiency and effectiveness. However, in the context of e-Gov, beyond productivity benefits there are further

downstream effects that accrue from e-Gov services, such as the potential greater level of responsibility displayed by public officials, greater information diffusion and greater community participation. These and other benefits, addressed in literature under various labels such as e-democracy and public participation, can often be ignored (Corsi & D'Ippoliti 2010).

Overall, study findings suggest that e-Gov not only can directly benefit efficiency and effectiveness, but also create downstream impacts such as information diffusion and service accountability. Both managerial and user-centered approaches can support productivity increases. From a managerial view, e-Gov can improve the monitoring of departmental staff, while from a user perspective e-Gov gives greater visibility to people about issues and puts pressure on government staff to demonstrate relevant output. These effects help net productivity increases and are a key enabler for uptake of e-Gov and PV creation.

6.7.2.5 Demand-side drivers / User needs

Supply-side managerial drivers serve to create an enabling environment for e-Gov uptake. By themselves these drivers are arguably not sufficient, nor are the clear benefits from e-Gov for the government sufficient. Rather, it is actually the citizens or end users who are the ultimate beneficiaries of these services (Rana, Dwivedi, Williams & Lal 2015). In this sense, the process of e-Gov uptake can be helped and the desired outcomes of PV creation can only be achieved when the user perspective is considered.

Convenience and ease of access are the fundamental demand-side driving forces for e-Gov initiatives. E-Gov projects can result in instant benefits, such as the reduced need to visit government offices and round-the-clock access from virtually anywhere in the world with access to internet. These benefits alone are key enablers for users' uptake of e-Gov. These benefits have been shown to enable e-Gov uptake in other emerging economies such as India (Gupta & Maurya 2020).

Besides convenience, another demand-side force greatly valued by users is online grievance redressal that helps resolve citizen issues with government departments and create greater user satisfaction (Rana, Dwivedi, Williams & Lal 2015). While dealing with the government agencies, users in developing countries often echo concerns about inefficiency, corruption and favouritism in public offices (Saxena, S 2017). E-Gov services are seen as a tool to ally these concerns and to improve accountability. Grievance redress mechanisms are seen as to play an equally important role in reducing corruption and favouritism as they constitute a

mechanism that in turn prompts public officials to act responsibly. Therefore, grievance redress is a key driving force from user perspective for both e-Gov uptake and PV creation.

6.7.2.6 Demand-side drivers / User disposition

The QUAN analysis, based on a consideration of technology readiness, revealed that motivating dispositions of optimism and innovativeness have a significant positive influence on user uptake of e-Gov. Similarly, inhibiting dispositions – discomfort and insecurity were found to significantly constrain e-Gov uptake. Empirical evidence suggested that at a user level motivating disposition of optimism and innovativeness act as an enabler, whereas inhibiting dispositions of discomfort and insecurity are constraining forces.

6.7.2.7 Demand-side drivers / Technology characteristics

Apart from user characteristics, QUAN analysis examined the relationship of technology characteristics on e-Gov uptake and user satisfaction. To recall, SEM analysis revealed that information and service quality significantly influenced e-Gov use, while relationship between system quality and e-Gov use was insignificant. A plausible explanation discussed for this insignificance was relative maturity of technology as users seem to no longer consider system quality as an issue or constraint. Conversely, while system quality showed no significant influence on e-Gov adoption in the QUAN inquiry, system-related application issues such as complex user interfaces and technical bugs in the e-Gov applications were commonly reported in the QUAL data. These issues are discussed in detail in section 6.5.

Prima facie, the qualitative and quantitative findings appear to contradict each other; it is, however argued that QUAL findings in fact extend QUAN findings. In effect, while QUAN data suggests system quality does not have a significant influence on e-Gov use; arguably it does positively influence user satisfaction that has been seen to central to wider user uptake. That is, system issues reported in the QUAL component of the study, like complicated user interfaces and technical problems, are not related to use but rather user satisfaction. In effect, it is only when using the system that certain issues associated with satisfaction can be encountered and reported. Therefore, the QUAN and QUAL findings complement each other. Of the system attributes, information and service quality invite e-Gov use, while all three system characteristics - information, system, and service quality - enable e-Gov user satisfaction.

6.7.3 Resisting or Constraining Forces

As discussed above, supply-side interventions such as government policy, accountability and productivity are fundamental drivers for uptake. However, and ironically, at the same time related supply-side factors such as policy inconsistencies and structural issues constrain e-Gov uptake and PV. The fundamental restraint to the creation of PV is the absence of a user focus. The related constraining forces from both managerial and user perspectives are discussed below.

6.7.3.1 Supply-side Resisting Forces

6.7.3.1.1 Policy void / inconsistencies

Qualitative data identified some key policy inconsistencies at a macro level in uptake and in subsequent value creation from e-Gov services. As such, Digital Pakistan Policy (Government of Pakistan 2018a) has a somewhat diminished utility due to certain internal in-consistencies. For example, the DPP envisions digitalisation in public schools, but the policy appears to ignore the prevailing reality of three different types of education systems in Pakistan– public, private and religious (Farooq, Feroze & Kai 2017). These three parallel systems represent diverse socio-economic backgrounds of students and for e-Gov services to have a broader impact requires a targeted policy to address the diverse and somewhat niche requirements of the different school communities.

Policy inconsistencies can in turn aggravate structural inconsistencies. There are arguably too many organisations tasked with e-Gov implementation, with overlapping functions and with little evident coordination. From the many discussions with managers, e-Gov implementation lacks a whole-of-government approach. Ideally, what is needed is a central authority that can oversee and coordinate e-Gov implementation among different government actors (Löfgren 2007). These policy and structural inconsistencies are typical of Pakistan but may be applicable to other emerging economies.

The Pakistan Telecommunication Authority (PTA), established in 1996, is the central authority for the telecommunication sector. Its main functions are to regulate telecommunications systems and services (*Telecom Re-Organization Act* 1996). Evidently, telecommunication has rapidly evolved in the last two decades which has transformed service delivery in both private and public sectors and innovative ICT and telecom enabled services like e-Gov are now possible. This in turn calls for a homogenous and holistic approach to ICT regulatory approach (International Telecommunication Union 2020). However, it is evident from QUAL data that in regulatory domain government has not kept pace with technological advancements and a regulatory void in terms of e-Gov is evident.

Arguably, there is a need for a centralised regulatory function to steer the growth of e-Gov, set technical standards and enable government agencies to develop e-Gov transformation and digitalization strategies. A similar approach is evident in some emerging economies, for example recently in Saudi Araba the Digital Government Authority has been constituted to formulate Saudi Arabia's digital strategy (DGA 2021). Developed economies like Australia has a Digital Transformation Agency (DTA), that gives policy leadership to the government on digital service delivery (DTA 2021). Consequently, the absence of a centralized policy-regulatory framework is seen as a significant barrier to e-Gov in Pakistan. The evident supply-side practitioner-centered bias is a significant inhibitor of e-Gov uptake and PV creation in Pakistan, and overall, the government seems blindsided to users' needs. Conversely, the objective of PV cannot be created without user needs being satisfied. As such, citizens are the ultimate users of e-Gov services so this indifference to user needs is a major barrier to e-Gov uptake and to public value creation.

6.7.3.1.2 Structural issues

Formal structures in the public service like laws, regulations and policy are important in the uptake of e-Gov. However, these structures often lack informal facilitating elements of trust and a willingness to change, which act to inhibit any change. At a structural level, the issues identified to constrain uptake of e-Gov include bureaucratic resistance, departmental silos, and the lack of a public advocate. Resistance at a structural level emanates from a lack of trust, lack of digital skills and a culture that inhibits innovation. Another structural issue connected with previously discussed policy-regulatory issues is the prevalence of departmental silos. For e-Gov to provide a range of information and services through a centralised platform – often known as one-stop shop (Knox & Janenova 2019b), there is a need for horizontal integration and coordination between government departments. This integration is difficult to achieve in silo dominated public administrations (Scott, I & Gong 2021). As such, most public sector agencies seem to work as silos which has made task of integration difficult and prevented the uptake of e-Gov.

6.7.3.2 Demand-side Resisting Forces

6.7.3.2.1 Social attributes

Pakistan is a heterogeneous society in terms of languages and culture. Most people speak and understand Urdu, but there are also many regional languages that are spoken in various provinces. In contrast to this linguistic diversity, it is English that is predominantly used in government communication. As well, most e-Gov websites and applications are in English. This is not a major obstacle to the educated minority who speak English, albeit as a second

language. However, most people in Pakistan are illiterate and largely unable to confer in English. This language disparity has noticeably impacted the reach and utility of e-Gov services that mostly are available only to those competent in English. Language is thus a major constraining factor to wider uptake of e-Gov.

Besides the reliance on English language, there are other demand-side constraints such as the country's low digital literacy (Nawafleh 2018). Studies have demonstrated that ICT training programs targeted to improve digital literacy can improve the e-Gov adoption (Chohan & Hu 2020a). Thus, while low digital literacy is a significant constraining factor for e-Gov uptake and to value creation it is not insurmountable. Another demand-side constraint is the reported lack of awareness of e-Gov services which hampers wider uptake of e-Gov services. A significant number of survey respondents echoed their concerns about a seeming lack of awareness of e-Gov services available to them. This is seen as another significant barrier for e-Gov uptake in Pakistan. Similar findings are reported in literature as a study on e-Gov awareness and uptake in South Africa showed that only 34 percent of people were aware of e-Gov services, and amongst these people who were aware, only one-third had used it (Mabinane & Edoun 2018).

6.7.3.2.2 Digital divide(s)

The existence of a digital divide is noted in general literature as a significant barrier to e-Gov adoption. The divide appears in various forms: in terms of disproportionate access to infrastructure, affordability, and skills. In some regards these effects are an indication of burgeoning socio-economic divisions in society (Hall & Owens 2011). Moreover, as another study noted, the divide(s) is detrimental to e-participation and it inhibits public value creation (Gounopoulos et al. 2020).

A digital divide was noted in the demographic data in the survey (Table 5.2). It was further substantiated in the interviews. More than 70 percent of survey respondents belonged to the upper middle / higher subjective socio-economic status, and some 80 percent of respondents were males. Moreover, an overwhelming majority had a secondary or higher education qualification. These demographic profiles illustrate several features of the inherent digital divides in Pakistani society – gender, most obviously, as well as education and hence digital and language literacy considerations. There are also gaps reported in capacity between rural/ urban services and the implicit diminished access to ICT-based systems because of limited economic resources. In stark contrast, in the interviews with government managers and providers, the view of the digital divide was primarily in terms of infrastructure provision that was conceived as a significant constraint on adoption and value creation of e-Gov.

Many features associated with the digital divide emanate from the socio-cultural dynamics of the country. With more than half of the Pakistan's population being female and living in a strongly patriarchal society, women have much less opportunities for education, work, and participation in economic and social democratic processes. Accordingly, e-Gov uptake is substantially constrained by a gender bias and the government will need to address endemic social factors by policy interventions to enable greater uptake and e-participation by all citizens. Equally, e-Gov is a solution since it offers a capacity to bypass many of the constraints placed on women (and other disadvantaged groups) in Pakistani society.

6.7.3.2.3 Second-order system attributes

Another resisting force raised by survey respondents was second-order system application issues. A lot of e-Gov applications have complicated user interfaces and are not very user friendly. Literature also shows that interactivity and responsiveness positively influence continuous use of e-Gov and a lack of these factors can discourage use (Li, Y & Shang 2020). Survey respondents noted issues with different applications like bugs and errors in e-Gov applications, outdated information, and a lack of responsiveness by officials. QUAN data offered empirical evidence that system attributes such as information, system, and service quality significantly influence user satisfaction. Lack of these system qualities by second-order effects are a significant barrier in e-Gov uptake from the user's perspective.

Recalling results of the QUAN phase of the study, SEM modelling showed that people's negative technology dispositions of discomfort and insecurity inhibit e-Gov use. A negative TR disposition can nonetheless be reduced by providing opportunities to improve digital literacy and trust in e-Gov services. Similarly, in terms of service quality, a lack of user orientation and responsiveness are significant constraints to use of e-Gov services.

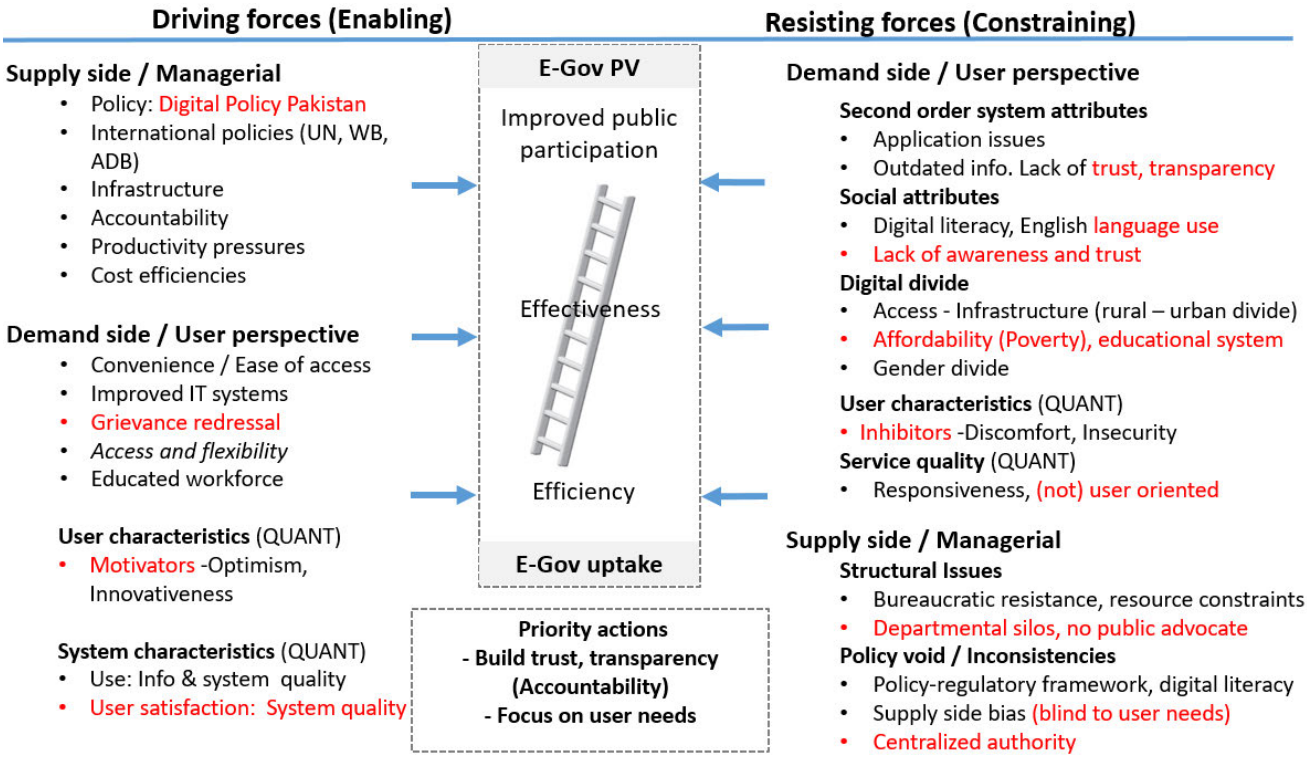
6.7.3.2.4 Completed FFA: factors enabling and constraining uptake and PV

Figure 6.13 presents a completed FFA of enabling and constraining forces in E-Gov uptake and PV. The central ladder illustrates the embedded digital divide and the progressive stages in creating PV – from *efficiency* to *effectiveness* and ultimately to improved *public participation*. Priority actions to build trust and focus on user needs are indicated below as hypotheticals, but they are arguably justifiable as central priorities for any change effort. The text shown in red are attributes that arise from the data and are arguably novel to this study and applicable to most emerging economies.

Creating PV is one of the key aims of public administrations (Kearns 2004; Twizeyimana & Andersson 2019b). The illustration of a ladder associates a continuum in PV creation that

ranges from cost-focused operational efficiency to functional effectiveness and ultimately higher-order attributes associated with improved public participation and what in related literature is described as e-democracy. This complex PV outcome can only be achieved by focusing on user needs and on enabling user satisfaction. As well, as earlier noted, the term e-Gov 'uptake', rather than a techno-centric 'adoption' is preferred as this helps shape the path towards creation of higher-order PV (see Figure 6.11). PV is created in a staged manner by first realizing operational efficiencies, then functional effectiveness and finally the highest order public values of improved public participation (Le Blanc 2020). Logically, the steps towards PV are not linear, as improvements to effectiveness and efficiency can both contribute to PV. However, the necessary enablers for each intermediate stage to PV places an emphasis on different values and requires different actions to support e-Gov uptake.

Figure 6.13: Force Field Analysis (FFA) – E-Gov Uptake and PV



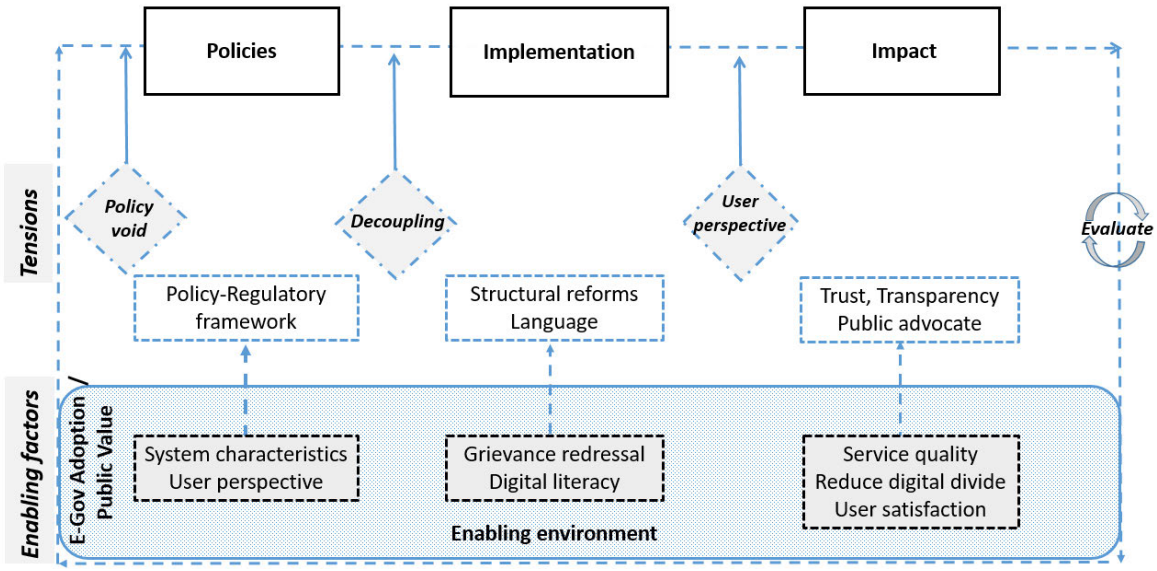
Arguably, however, the fundamental attributes to enable PV are trust and transparency. More immediate and tangible user constraints include the digital divide(s), and language, while structural barriers include a lack of accountability by government officials, bureaucratic silos where departments do not communicate with one another and the lack of a central authority to guide the development and implementation of digital policy and infrastructure.

6.8 Policy and Practice framework (RO 2.3)

To recall, RO 2.3 of the study was to: *develop a policy and practice framework to support successful adoption and creation of PV in an emerging economy*. In keeping with the pragmatic philosophy of the study, the fundamental element of a practice framework is an outcome-oriented focus. In terms of outcomes, an e-Gov policy and practice framework is driven by a user-driven focus on PV-based outcomes in contrast to the managerial perspective that currently exists based on the empirical data (Bowen & Zwi 2005).

The framework is built on previous QUANT and QUAL discussion and is conceived as a three-stage process: policy, implementation and impact (Graafland & Smid 2019). This is illustrated in Figure 6.14 and the approach is consistent with other evidence-based approaches used in education, health, and science to ensure a comprehensive approach to practice and decision making. The framework arguably identifies a theory-of-change model based on a description of logical causal relationships and the multiple levels of conditions or results that are involved or needed for a longer-term PV focused result.

Figure 6.14: E-Gov Policy and Practice Framework (RO 2.3)



The framework also highlights potential tensions at each stage of the practice framework. These tensions can constrain e-Gov uptake and PV creation. They are namely: a policy void, decoupling and a lack of a user perspective. It is also evident that policies and practices require evaluation and continuous improvement (CI) to keep up with the national and global changes, while the necessary enabling environment is highlighted in blue in Figure 6.14. This enabling environment can help reduce the noted tensions and facilitate uptake

processes through identified enablers such as a user perspective, designing an effective redressal, improved digital literacy, service quality and CI processes.

6.8.1 Tension -1: Policy Void

The first tension identified is ad-hoc and inconsistent policies noted in some instances, while at other times there was a total policy void. As such, rules, regulation and policies acquire authority from an authorising legal framework and political processes. In democracies, public representatives set out principles of public policies through legislation, whereas the executive branch or the bureaucracy implements the legislation through regulations (Kosti, Levi-Faur & Mor 2019). In Pakistan's case, this tension is manifested in two ways: not only is there a legal void (such as in case of e-voting) but there are also policy inconsistencies that deter widespread uptake of e-Gov and PV creation.

Resolving this tension of policy void requires, firstly, a legal framework to enable a fully functional participatory e-Gov system like e-voting, as well as updated cyber laws and laws relation to data security and privacy that are not presently available. Secondly, it requires a policy-regulatory framework that is contingent upon the legal framework. This is currently absent. In effect, successful e-Gov implementation requires a whole-of-government and standardised approach and a fully functional e-Gov ecosystem that involves active coordination across the various government agencies with a standardized approach. Thirdly, although the government has tried to give e-Gov and digital policy direction by establishing the DPP, this step while in the right direction is not sufficient. What is missing is a holistic approach to address a host of issues in the Pakistan's context. These include the need for actions to build trust and transparency, as well as specific policies to address accountability, as well as endemic socio-economic issues related to gender and education inconsistencies with embedded literacy and digital skills weaknesses.

Quantitative analysis evidenced by the SEM path analysis showed that motivators – optimism and innovativeness - enable e-Gov use. Conversely, the two inhibitors identified – discomfort and insecurity - can constrain e-Gov use. These motivators and inhibitors collectively form the construct of TR or technology readiness that has been found to significantly influence e-Gov uptake (Parasuraman & Colby 2015). The results show TR is a good predictor of adoption (use). However, the relationship of motivators and inhibitors with user satisfaction was found to be not significant, indicating the limitation of TR as a predictor of user satisfaction and wide uptake. Rather, system characteristics were found to be good predictors of user satisfaction. Practice implications arising from this finding is

that; to increase uptake by citizens, the government needs to direct efforts towards user-focused strategies, such as improved skills, training and digital literacy, and improved service quality in e-Gov services. Conversely, the policy challenge for government policymakers and e-Gov practitioners is to focus on creating the supportive regulatory mechanism and consistent policy frameworks. Effective legislation is a necessary first step towards creating an enabling environment, but alone this action is arguably not sufficient. We turn next to the second tension in the system.

6.8.2 Tension 2: Decoupling between Policy and Implementation

A second tension area is between policy and implementation, which is termed decoupling. This tension indicates the potential disconnect between extant policies and what is being implemented. There can be many reasons for this decoupling. In terms of e-Gov implementation in Pakistan there are, for example, different actors with often competing and overlapping interests. To name a few of the many stakeholders in e-Gov implementation, these include: the Ministry of Information Technology and Telecommunication (MoIT), the National Telecom Corporation (NTC), the National IT Board (NITB), the Electronic Certification and Accreditation Council (ECAC), the National Telecommunication and Information Security Board (NTISB), the Pakistan Telecommunication Authority (PTA), and the National Database and Registration Authority (NADRA).

Given the many actors with overlapping or very different interests and unclear responsibilities, there is a strong reason to be concerned over implementation. What is required is a centralised and coordinated effort based on a centralized agency to coordinate among diverse set of stakeholders in an attempt to bridge this decoupling. In contrast, the current highly decentralised approach has led to the creation of "digital islands" or departmental silos within and across different tiers of government, so decoupling between policy intention and implementation is no surprise.

6.8.3 Tension 3: Lack of Focus on the User

As we recall, the literature identified an e-Gov paradox – that described the apparent failure to successfully implement e-Gov service initiatives despite the rising sums of money being directed towards such projects (Ojha & Pandey 2017). Based on the findings from this study, the paradox can be partially explained by the fact that governments themselves cause much of this difficulty. The evidence suggests a supply-side managerial focus on cost efficiencies and resource savings can lead governments to become blindsided to users' needs and

relevant demand-side considerations. A critical examination of e-Gov adoption and the associated paradox also reveals the interrelated effect of elements such as bureaucratic structures and managerial resistance to change, as well as socio-cultural norms that exist simultaneously and that persist over time.

Extending the focus from technology adoption to impact and specifically PV, helps to illustrate two key considerations that reflect interrelated effects that sustain the e-Gov paradox. First, adoption is determined initially, at least, by ICT system-based operational considerations. The metric for operational functionality is use, as distinct to user satisfaction. The precursor condition for e-Gov adoption is individual technology readiness, alongside system functionality based on ICT reliability. However, functional efficiency that encourages use does not include the condition of sufficiency. Rather, the findings show that sufficiency requires a further condition – user satisfaction, which as distinct to use is influenced by service quality and attributes such as responsiveness and flexibility of use.

Second, the motives for e-Gov services can be differentiated between efficiency in use and effectiveness. The former emphasises supply-side cost and resource-based considerations and is associated with a top-down, managerial perspective. The latter is a demand-side focus, described as emphasising user needs associated with a bottom-up citizen perspective. As we established earlier, efficiency and use of ICT are not sufficient. Rather, for PV impact measured by social equity and public participation the emphasis must shift to user satisfaction and effectiveness measures for e-Gov services such as trust, transparency, and general user needs. These needs include security, reliability, flexibility, and choice of language options not limited to English, which is not commonly used in Pakistan.

6.9 Summary

This chapter presented the results of qualitative data and a synthesis of the QUAN and QUAL findings with literature to arrive at a viable policy and practice framework (Figure 6.14). Based on the study findings, it is argued that creating PV is foundational to improved public uptake of e-Gov services in Pakistan. What it requires though is a paradigm shift in focus from a managerial to a user perspective. To sustain this change, there is an arguable need for a change in language – from technology adoption to uptake with an associated shift in focus from use to user satisfaction, which is more strongly associated with e-Gov PV. While PV is arguably enabled by both use and user satisfaction, uptake is a more productive term than adoption of e-Gov services intended to achieve higher-order value ideas of social equity and public participation that are integral to the notion of PV.

A second insight relates to understanding the e-Gov paradox as being at least partially self-generated by the bias towards supply-side factors and a lesser consideration of user need. Related analysis shows many features that make up the digital divide(s) in Pakistan and which hinder the wide uptake of e-Gov and constrain the creation of PV, are manifested in terms of socio-cultural considerations. A single powerful illustration of the influence of socio-cultural consideration is the primary use of English in e-Gov service provision, but most people in Pakistan, particularly in the rural areas, do not speak it. Widening the language options from English to include the primary regional languages would stand to dramatically expand access to e-Gov services and so in time understandably improve uptake and PV as well.

CHAPTER 7: CONCLUSION

7.1 Introduction

This study set out to examine factors that influence e-Gov adoption and the creation of Public Value (PV) in Pakistan. A key consideration was the e-Gov paradox noted in the literature. The paradox or puzzle arguably explains the low adoption of e-Gov services by citizens and the failure to realise the intended impacts. This chapter summarises the study findings, to answer the reported e-Gov paradox and research questions related to adoption and the creation of PV. Two research questions were identified. RQ1 investigated the interplay between individual and system characteristics on adoption of e-Gov services, while RQ 2 looked at how governments can support adoption and creation of PV in Pakistan. To answer these RQs, five ROs were envisaged, and a convergent parallel mixed methods approach was adopted.

Quantitative data and the hypothesised relationships were tested using SEM analysis, whereas a thematic analysis was used for qualitative data analysis. QUAL data was sourced from 9 semi-structured interviews with senior managers working for the government, supplemented by two open-ended questions in the survey. This QUAL data was used to assess impact in terms of PV that also enabled to have richer and deeper insights to understand the problem The results of both quantitative and qualitative data analyses were then triangulated and synthesised to develop an e-Gov policy and practice framework suitable for Pakistan and could be viable in other emerging economies.

Key research findings are summarised including a revised conceptual framework (CF) that reflects the main insights drawn from this study. Drawing on these findings, a key distinction is made in language to emphasise e-Gov uptake over adoption. The former arguably helps associate implementation with user satisfaction and a user-centric approach, while the latter is more about technology use and has a bias towards a technocratic approach. The chapter then discusses the main contributions of the study to e-Gov implementation, with policy and practice implications also noted for governments seeking to create PV using e-Gov services. Finally, some limitations of the study are discussed, and future research directions are outlined.

7.2 Revisiting Study Aims and Objectives

Chapter One introduced what is known in literature as an e-Gov paradox that explained the disparity between investments made on e-Gov initiatives and results achieved thereof. Since e-Gov initiatives attract substantial funding by governments and from international financial institutions (Savoldelli, Misuraca & Codagnone 2013; World Bank 2021a), reasonably positive impacts are expected. To illustrate this, the World Bank has funded projects worth over USD 83 billion in the last two decades to support e-Gov initiatives in emerging economies (World Bank 2021a). In addition to that Government of Pakistan (GOP) allocated an annual budget of USD 383.5 million equivalent[2] for public sector IT projects for the 2020-21 financial year (Finance Division 2020). Yet, despite these substantial investments and associated policy interventions, adoption of e-Gov services is still low (Jacob et al. 2019; Pérez-Morote, Pontones-Rosa & Núñez-Chicharro 2020; Rana et al. 2017). A similar situation is reported in in other emerging economies (Knox & Janenova 2019a), with the majority of the projects completely or partially failing to achieve their objectives (World Bank 2016).

The e-Gov paradox is rooted in two fundamental issues: first, the low adoption of e-Gov services by citizens and second, not getting the desired impacts (Castelnovo 2010; Otieno, Omwenga & Waema 2016; Savoldelli, Codagnone & Misuraca 2014). This study aimed primarily to untangle this paradox while addressing adoption and PV. Consistent with the reasoning of low adoption and failure to achieve the desired impacts, two research questions were framed: first to address adoption and, second to address impact (see Chapter One, section 1.3.4). Research findings are summarised below.

7.3 Summary of QUANT Findings

The QUANT approach answered RO 1.1 and 1.2 of the study and these ROs were further broken down into 12 hypotheses. To empirically examine these hypotheses, the quantitative data was collected from citizens using online survey and analysed using multivariate technique of Structured Equation Modelling (SEM). As part of SEM analysis both the measurement and structural models were validated. Motivators, inhibitors and PV were specified as three higher-order constructs in the SEM model. Based on Technology Readiness (TR) theory, motivators were specified as a higher-order construct (HOC) with optimism and innovativeness as lower-order components. Similarly, inhibitors were specified as HOC having discomfort and insecurity as respective lower-order components.

[2] PKR 6673 million converted at $1=173.9 PKR (based on Nov 2021 data).

The third higher-order construct, PV was specified with efficiency, effectiveness and improved democracy as its respective lower-order components. This HOC conceptualisation allowed flexibility to conceptualise the constructs at a higher level of abstraction (Sarstedt et al. 2019). This was particularly advantageous as it reduced the relationships in the path model and helped achieve model parsimony (Johnson, Rosen & Chang 2011).

To address RO1, i.e. to examine interplay of individual and system characteristics on e-Gov adoption (in terms of use and user satisfaction), ten hypotheses (H1 to H10) were framed. SEM analysis and hypothesis testing showed that individual characteristics operationalised through the construct of technology readiness (TR) are good predictors of e-Gov use (USE) but not of user satisfaction (US). Of the system characteristics, information quality and service quality did significantly influence e-Gov use, but there was no significant effect of system quality on e-Gov use, presumably because technology is now sufficiently advanced for functionality to be normalised as a user expectation (Sorongan & Hidayati 2020; Wang, Y-S & Liao 2008). Results of hypothesis testing further revealed that all three system characteristics, i.e. information quality, system quality and service quality, significantly influenced user satisfaction, with service quality being the strongest predictor.

To address RO1.2, we examined the effect of e-Gov use and user satisfaction on perceptions of PV, and H11 and H12 were tested. The results revealed that user satisfaction is the strongest predictor of PV. The results of the hypothesis testing are summarised in Table 7.1.

Table 7.1: Summarised results of hypothesis testing

		Path coefficients	t value	p values	Decision
H1	Motivators→ USE	0.202	3.752	0.000	Supported
H2	Inhibitors→ USE	-0.110	2.313	0.022	Supported
H3	IQ→ USE	0.355	4.202	0.000	Supported
H4	SQ→ USE	0.000	0.002	0.998	Not supported
H5	SVQ→ USE	0.204	2.673	0.007	Supported
H6	Motivators→ US	-0.029	0.875	0.386	Not supported
H7	Inhibitors→ US	-0.046	1.547	0.121	Not supported
H8	IQ→ US	0.263	3.920	0.000	Supported
H9	SQ→ US	0.292	4.519	0.000	Supported
H10	SVQ→ US	0.363	5.626	0.000	Supported
H11	USE→ PV	0.276	3.750	0.000	Supported
H12	US→ PV	0.316	4.141	0.000	Supported

7.3.1 Actors in the Adoption Process

Arguably, there are two primary actors in an adoption process: first, the adopter (the individual user) and second the (system) characteristics of the technology artefact being adopted. It is clearly important that both are considered when examining e-Gov adoption or rather uptake. Viewing these two actors, a policy and practice framework must incorporate both individual dispositions and system characteristics to shape adoption or uptake from a user perspective.

Of the individual characteristics optimism and innovativeness act as motivators, whereas discomfort and insecurity constitute the inhibitors in individual dispositions. These motivators and inhibitors form the construct of technology readiness (Parasuraman & Colby 2015). The study found a significant positive relationship between the motivators and e-Gov adoption, and a significant negative relationship between the inhibiting dispositions and e-Gov use. Overall, when examining e-Gov adoption, this result indicates validity of the construct of technology readiness in Pakistan, suggesting government policies must aim to increase people's technology readiness to help improve uptake of e-Gov services.

Conversely, both TR sub-dimensions, motivators and inhibitors were found to have no significant influence on user satisfaction. This is understandable since TR depicts the propensity to accept (use) a new technology (Parasuraman & Colby 2015), whereas satisfaction is more a factor of utilitarian benefit of a product or service (Lee, S & Kim 2018). System characteristics – information, system and service quality - represent these utilitarian benefits of the e-Gov system and are found to significantly influence user satisfaction. Of the three, the effect of service quality was the strongest on user satisfaction.

To summarise the results of RO1.1, individual characteristics in terms of TR motivators and inhibitors strongly influence e-Gov use, however they exert no significant influence on user satisfaction. Conversely, of the three system characteristics, only information quality and service quality significantly influence e-Gov use. Nonetheless there is no significant influence of system quality on e-Gov use. Regarding influence of individual characteristics on user satisfaction, either the TR motivators or inhibitors have no significant relationship with user satisfaction. However, all three system characteristics strongly influence user satisfaction, and of these three, service quality is the strongest predictor of user satisfaction.

RO1.2 sought to examine e-Gov impact from a citizen's perception measured in terms of PV dimensions. As such, e-Gov impact can be seen as a summative variable that represents

the expected results or net benefits of e-Gov initiatives (Moon, MJ & Norris 2005; Scott, M, DeLone & Golden 2016). These expected results are efficiency, effectiveness and improved democracy according to Scott, M, DeLone and Golden (2016). To operationalise these variables for quantitative analysis, a higher-order construct of PV was specified using three sub-dimensions: efficiency, effectiveness and improved democracy in SmartPLS and hypothesised relationships H11-H12 were tested. The results of PLS SEM modelling revealed that both e-Gov use, and user satisfaction significantly influence citizens' perceptions of PV, with user satisfaction having the strongest effect on PV perceptions. These results suggest that higher the user satisfaction, the greater will be the perceptions of public value realised from using e-Gov services. Also, the results of hypothesis testing revealed that the strongest predictor of user satisfaction is service quality, thereby indicating the importance of service quality for creating PV.

7.4 Summary of QUAL Findings

The QUAL approach was used to answer the RO 2.1, 2.2 and 2.3. The QUAL approach was based on two sources of data. First, semi-structured interviews conducted with public sector e-Gov managers. The second source of QUAL data comprised open-ended questions included in the citizen survey questionnaire. The open-ended survey responses offered a user-view related to adoption and PV, whereas the interviews with e-Gov managers offered a practitioner or managerial opinion on e-Gov adoption and PV issues. Thematic analysis was used to bridge the QUAN-QUAL divide (Terry et al. 2017). Collating both managerial view and citizen narratives enabled to uncover inconsistencies between policy and implementation. It also helped to find significant challenges that impede PV creation in Pakistan. The QUAL inquiry reinforces the results of quantitative (QUAN) findings. The following sections summarise the key results of QUAL findings.

7.4.1 Enabling Environment

The QUANT phase identified the interplay between individual and system characteristics on e-Gov adoption. Apart from these considerations, another important issue is the context or enabling environment in which the adoption process occurs. The environment, if an enabling one, will help this process of uptake or otherwise discourage it. The qualitative inquiry shed light on the important role of an enabling environment for successful e-Gov uptake. It is facilitated by necessary government policy interventions and sustained by structural reforms to reduce the digital divide and enable transparency in government processes.

7.4.2 Uptake vs Adoption

Adoption and uptake are often used synonymously but based on this study there is a subtle difference evident between the two concepts, and it can lead to very significant results. Adoption is associated with use while the core focus of uptake is user satisfaction. The distinction is in the driving motive. While e-Gov services adoption is arguably top-down, managerial or technocratic in focus, uptake is initiated and driven by the user; for example, "*I need an e-Gov application as it saves me time*". In contrast, adoption is technology use focused: "*This e-Gov application has one million active users*". Uptake is more than just 'use'; it is founded on user satisfaction with the new (e-Gov) service. Linking this distinction back to the public value proposition, it is demonstrably important that interventions focus on uptake rather than adoption to create PV outcomes that extend beyond cost- and resource-savings efficiencies.

7.4.3 Public Value

The study reported a significant positive relationship of both e-Gov use and user satisfaction on creating PV. Since users cannot accrue any value unless they use an e-Gov system or a service, a positive relationship between use and PV is expected. The strongest influence on PV was however by user satisfaction. Using the analogy of a ladder, simple (lesser) forms of PV are associated with operational efficiency in terms of time and cost savings and are at the bottom of the ladder. Functional effectiveness places greater value on matters such as redressing grievances and round-the-clock availability of e-Gov services. This is a higher level of PV and conceptually can be placed in the middle of the ladder. Finally, improved public participation and associated benefits to democracy are conceptually the highest forms of PV and placed at the top of the ladder. To reach this top, uptake is important. If the government's aim is to climb this PV ladder and enable participatory democracy values, the findings show that governments need to shift the focus from supply-driven policies to a demand-oriented user-centric approach. Moreover, this transformative change involving socio-political impact will require preconditions of trust and transparency. Arguably, trust is a fundamental enabler for e-Gov uptake. No matter how efficient or effective e-Gov is; if people do not trust an innovation or the government, they are unlikely to use it.

Understandably, then, an important consideration in implementing e-Gov services is developing the desired level of trust in government and e-Gov services. Examples from private sector technology-based companies such as Airbnb can offer useful insights. For Airbnb, a well-designed reputation system plays an important role in building trust between

providers and clients (Gebbia 2016). A similar well-designed e-Gov reputation system, where citizens can rate and provide feedback on government services and where they can share their individual experiences can help build trust. Trust building can also be facilitated by measures taken to reduce the digital divide and by a greater focus on user needs including providing e-Gov services in local languages. Such measures will facilitate uptake and help realise higher level of e-Gov value by improved public participation.

7.4.4 E-Gov Paradox (Revisited)

As we may recall, the literature identifies an e-Gov paradox in that the result of many e-Gov initiatives is contrary to expectations: despite more money being spent on such projects, they often tend to fail in terms of achieving stated objectives (Castelnovo 2010; Otieno, Omwenga & Waema 2016; Savoldelli, Codagnone & Misuraca 2014). It is possible to argue that the paradox is ironically explained, at least in part, by the fact that governments themselves are the cause of much of this difficulty due to interrelated impact of factors such as bureaucratic structures and managerial attitudes, as well as cultural norms that exist simultaneously and that persist over time.

In this study, extending the focus from technology *adoption* to also examining *impact* in the context of PV, helped illustrate two fundamentals in e-Gov projects. These fundamentals and interrelated effects, which appear to sustain the e-Gov paradox, are discussed below:

- First, *adoption* is determined initially, at least, by ICT system-based operational considerations concerned with *use***,** as distinct from user satisfaction. The necessary precursor condition for adoption or use is e-Gov functionality benefits based on efficiencies. However, functional efficiency intended to enable use does not have the condition of sufficiency, which the study findings suggest also requires *user satisfaction*. User satisfaction**,** as distinct from use, is primarily based on perceptions of *service quality* that are shaped by attributes such as system responsiveness and user orientation.
- Second, the government's desire to introduce e-Gov services can be differentiated by a concern over *efficiency in use* from *effectiveness*. The former emphasises cost and resource-based considerations associated with a top-down, managerial perspective. The latter is described as emphasising user needs associated with a bottom-up user-centric perspective. As we have established earlier, efficiency and use are not sufficient. Rather, particularly for higher-order PV impact measured by public participation, the emphasis must shift to *user satisfaction* and *effectiveness*

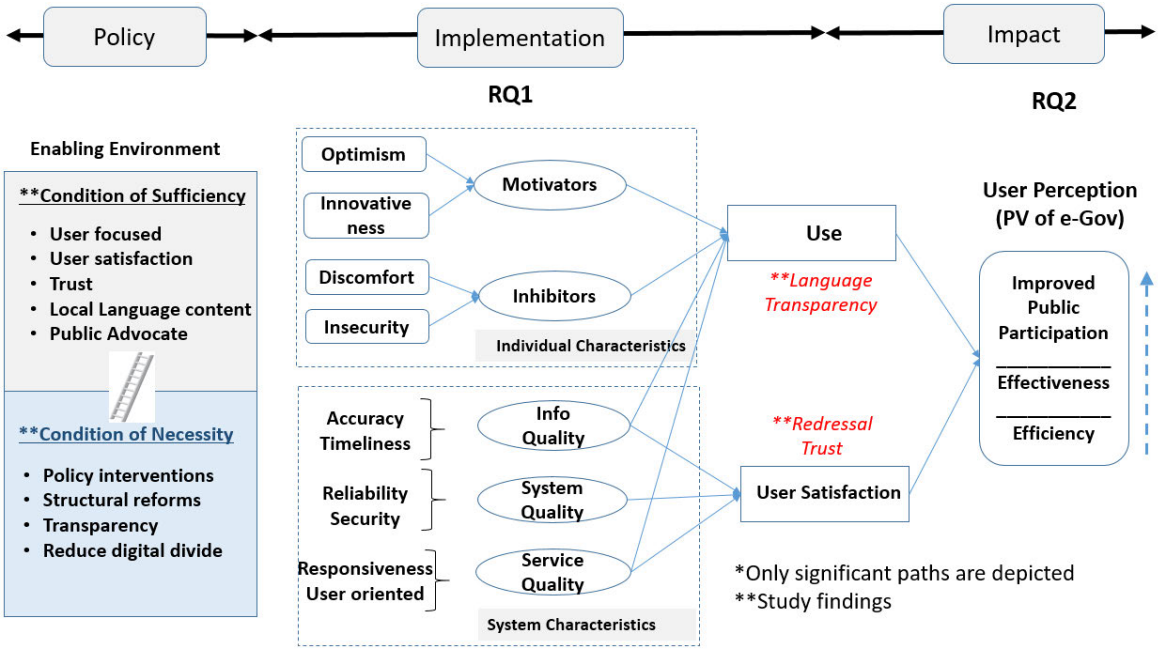
measures, such as trust, transparency and other general user needs including security, reliability, flexibility and language options not limited to English, which is not commonly used in Pakistan.

In summary, based on the study findings, resolving e-Gov paradox and to achieve the anticipated objectives of PV creation require a paradigm shift from a managerial to a user-centric perspective by implementing agencies and government institutions. To sustain this change, there is a need to differentiate between use associated with (technology) adoption and user satisfaction associated with public uptake intended to achieve social equity and public participation outcomes that are integral to PV. This distinction helps characterise PV as enabled by both use and user satisfaction, but with *uptake* a more effective operational term than *adoption* for e-Gov service initiatives.

7.5 Conceptual Framework (Revised)

The conceptual framework devised to guide this study and QUAN hypotheses development was developed in Chapter 3 (see section 3.3, Figure 3.4), and the revised version is presented in Figure 7.1. It adds the many insights to existing theory using a multi-level approach. Reframing these insights and related theoretical constructs, the revised framework identifies three broad policy and practice areas: initiating policy and antecedent environmental contexts, implementation process and finally impact that measures PV across the three ascending categories of efficiency, effectiveness and improved public participation, which is preferred to 'improved democracy' that is used in literature. Briefly, to explain, improved participation as a tertiary level outcome reflects the local user perspective better, appears less ideological and it focuses positively on user perceptions of impact. Collectively, this approach may better translate in the national and geographic context for Pakistan and the other emerging economies.

Figure 7.1: Revised Conceptual Framework



To elaborate further, governments can give effect to policy through legislation, enacting rules and regulations (Guermazi & Satola 2005). Based on the thematic analysis, two specific categories of conditions that enable PV are identified: necessary conditions and sufficient conditions. Necessary conditions are the required elements of policy to create an enabling environment or foundations for successful e-Gov uptake. These include specific policy formulation and structural reforms providing the necessary legal and regulatory considerations in public policy formulation and create the facilitating conditions for growth of the desired e-Gov service (Guermazi & Satola 2005). Often these policy considerations will be influenced by international policy objectives such as the UN SDGs (UN (2016), to which e-Gov initiatives are central to achieving these goals.

Viewing national priorities and the international agenda, policy interventions are essential for e-Gov diffusion. Policy interventions are also needed to bridge the digital divide(s) noted in Pakistan, particularly by enhancing access to ICT infrastructure in rural communities, by improving digital literacy and affordability, and by shaping socio-cultural dynamics to enable greater participation by women. While these necessary conditions are important, sole reliance on these conditions of necessity will arguably lead only to achieving lower-level PV impact which primarily means better efficiency. To realise highest-order public value such as improved public participation, necessary conditions are important but not sufficient. To achieve a condition of sufficiency, it is important that governments shift their focus from adoption to uptake. This change entails a shift in focus from a supply or managerial

approach to a demand or user-centric approach. This shift in focus will achieve greater user satisfaction and build trust.

A further simple yet necessary change is to make e-Gov services available in local languages rather than solely in English. Having a public advocate or a digital ombudsman can also help uptake by introducing an intermediary to resolve user issues. Arguably, the broad change need for the government is to traverse up the PV ladder and to shift from a sole focus on 'conditions of necessity' to a greater emphasis of 'conditions of sufficiency'. Conversely, for users, the mirror opportunity to move up the PV ladder is to reap the benefits of effective e-Gov services and greater public participation.

The second stage of the framework is policy implementation. This stage is concerned with how the proposed policy initiatives are applied and how the necessary changes to the system are introduced (Mugwagwa, Edwards & de Haan 2015). This stage is the crucial challenge, evidenced by low adoption despite nearly two decades of policy effort and huge investments by the government to promote e-Gov services in Pakistan (Haider, Shah & Chachar 2017). Various UN reports confirm this problem, with Pakistan ranked below global and regional averages in both the e-Gov development and e-participation indices (UN 2018b). The revised conceptual framework adjusts for the likely challenges in implementation by including both user and system characteristics.

Typically, the focus in the literature has been on theories and models of technology adoption such as Diffusion of Innovation by Rogers (2010), Technology Acceptance Model (TAM) by Davis (1989), Information System (IS) success model by (Delone & McLean 2003) and the Unified Theory of Acceptance and Use of Technology, such as by Venkatesh et al. (2003). Arguably, the focus of these models is on explaining adoption by reference to the characteristics of technology, such as perceived usefulness and ease of use, complexity, compatibility, social influence, etc., or by examining the various technology designs or quality dimensions associated with the technology artefact under examination (Westjohn et al. 2009). Yet, individuals are the most important actors in adoption and uptake. Thus, as some studies suggest, it is important to investigate the interaction between technology characteristics and individuals (Parasuraman & Colby 2015).

The revised conceptual framework in Figure 7.1 answers this call by catering for characteristics of the system or technology artefact and includes disposition of the individual. The framework depicts the significant paths. Empirical evidence suggested that at a user level, motivating disposition of optimism and innovativeness act as enablers, while

dispositions of discomfort and insecurity act as a constraining force. Turning to system characteristics, SEM analysis established that information and service quality significantly influences e-Gov use, which is consistent with earlier findings (Sorongan & Hidayati 2020; Wang, Y-S & Liao 2008).

The third stage, impact, provides an opportunity to also evaluate the impact or outcomes envisioned at policy stage and, as necessary, to enact change course for more effective policy formulation and implementation. The study adopted a PV approach to assessing e-Gov impact. PV defines a new way of evaluating government services in terms of efficiency, effectiveness and social values (Bryson, Crosby & Bloomberg 2014; Stoker 2006). The focus on PV is described as an important shift from service production to service delivery when meeting citizens' expectations (Panagiotopoulos, Klievink & Cordella 2019). Three overlapping and complementary e-Gov categories were noted, ranging from managerial operational efficiencies, user-centric functional effectiveness and community-wide socio-political impacts.

The managerial view, unsurprisingly, was noted as focusing on the provision of services. The impact of these services was typically expressed in terms of efficiency of use related to cost and process savings, including greater productivity of staff in government offices. From a user perspective, services and impact were characterised as expressed in terms of functional effectiveness. This included time saving for users, the inclusion of grievance redress mechanisms, as well as information quality and service reliability. A further level of e-Gov value associated by users is socio-political benefits. This highlights ideas such as social equity, empowerment for women and greater participatory democracy. The key finding to realising higher levels of PV and the social benefits of socio-political and public participation, is that user satisfaction is of paramount importance. Empirical evidence showed that the strongest antecedent to user satisfaction is service quality. Other important antecedents included the option for grievance redress and trust building mechanisms that influenced user satisfaction and the creation of PV.

7.6 Study Contributions

The study has arguably made several contributions to the field of e-Gov in both theoretical and practical terms. This study has explained e-Gov uptake as an integrative multilevel effect of individual (user) and system characteristics. There is limited evidence of such an integrative approach (Lin, C, Shih & Sher 2007; Meuter et al. 2005; Rana et al. 2017). This study has developed and empirically tested an integrated multilevel model supporting e-

Gov uptake, an approach recommended in the literature (Jacob et al. 2019; Rana et al. 2017; Taherdoost 2018).

A further theoretical contribution of the study is to unpack the reported e-Gov paradox. This is achieved by focusing on PV to examine impact in conjunction with technology adoption. This widened focus has only been used in a few studies (Scott, M, DeLone & Golden 2016), with none evident in a developing or emerging economy context. Based on this study, it is possible to argue that the reported e-Gov paradox can in a large part be resolved and the anticipated higher-order PV goals can be substantially achieved, when governments shift their focus from a managerial perspective to a user's perspective. This will necessitate a paradigm shift, and as this study later notes in the context of e-Gov implementation, to also involves complex, hard to solve internal processes such as political norms and citizen trust. As well, this study suggests the need to differentiate between use that is associated with adoption, and user satisfaction that is more strongly associated with e-Gov uptake. While PV is enabled by a focus on both use and user satisfaction, uptake has been identified as a more productive pathway for e-Gov interventions to achieve social equity and public participation. These latter outcomes are integral to the higher-order benefits associated with PV that in turn are strongly associated with the UN's SDGs.

Further, the study makes a useful methodological contribution in terms of applying a mixed methods approach in e-Gov research. This study adopted a multilevel mixing collecting QUAN data for citizen level and QUAL data from the practitioner level. Results are integrated into the e-Gov policy and practice framework. Such a design not only integrates quantitative and qualitative data but also the data at different levels of analysis. There is very limited published research discussing integration of multilevel mixed methods research and this area does require further research (Headley & Plano Clark 2020; Schoonenboom & Johnson 2017).

7.7 Policy and Practical Implications

As this study has noted, e-Gov implementation and PV, especially the higher-order benefits associated with participatory democracy, are connected to complex internal processes and political norms, as well as deep trust-based considerations. The key policy and practical implications are identified in Figure 7.1, which identified three key stages in a policy and practice framework to support e-Gov uptake and create PV. The framework is specific to Pakistan, but it can arguably be applicable to other emerging economies.

The first policy implication highlighted by the framework relates to the antecedents to adoption – identified by what is deemed the enabling environment for e-Gov uptake. In turn, for effective e-Gov implementation, two process components, individual and system characteristics, are highlighted for policymakers and practitioners. Emphasising the creation of PV, two pathways, use and user satisfaction to PV outcomes are identified as illustrated in Figure 7.1. Accepting these two pathways, the key policy focus in implementation needs to be on enabling systems that can achieve and improve accountability and transparency, and redress and trust, respectively.

A second policy implication relates to the necessary conditions in the enabling environment that acts as the foundation for successful e-Gov service uptake. These conditions include specific policy formulations and structural reforms that provide the necessary legal and regulatory considerations for public policy and that create the conditions for continuous improvement of the desired e-Gov service (Guermazi & Satola 2005). As also noted earlier, policy considerations are influenced by international policy objectives and e-Gov services are central to achieving many of the identified UN SDGs. The focus on e-Gov is driven by its immediate relevance to the Pakistan government's objectives in terms of IT enablement and wider adoption of e-services in accordance with Digital Pakistan Policy (DPP) (Government of Pakistan 2018b). These objectives are further reinforced by UN SDG goals that identify access to e-Gov as a key enabler to make these achievable. So notwithstanding national priorities, the international agenda makes widespread e-Gov uptake essential.

A practical challenge to policy implementation is the ambiguity and many policy overlaps between the multiple government agencies that confuse and reduce accountability and responsiveness. In effect, these challenges lead to a decoupling of policy and implementation. Arguably there is a paradigm shift required in policy and practice involving the adoption of a user-centric perspective. Figure 7.1 offers a practice practical pathway to direct policy efforts towards relevant areas and for enhanced and widespread e-Gov uptake by the people in Pakistan. For example, information quality has the most dominant initial effect on e-Gov use. However, it is perceptions of service quality that has the most significant effect on user satisfaction that drives PV. The subsequent key practice implications are to first ensure the provision of up-to-date and accurate information to attract greater uptake. Thereafter, once people start using these services, user satisfaction is crucial and is contingent on the provision of high quality of services.

E-Gov in the Context of the COVID-19 Pandemic

A final comment is appropriate given that the world is experiencing a global pandemic that has forced lockdowns and global disruption of usual business process. From a government-citizen relations perspective, the pandemic has made it a lot more difficult for governments to provide services, with employees unable to attend offices. From a citizen perspective, the pandemic has in turn made it difficult to access face-to-face services due to the lockdowns and restrictions on movements. Positively, the immense challenges the pandemic has brought has also provided (forced?) governments to pursue more extensive digital strategies given the limits of time and space, and for citizens to adopt these services. In this sense, we believe the pandemic has serendipitously created a need and an impetus for citizens to adopt e-Gov services. It remains for governments to capitalise on by providing both a suitable enabling environment and focusing on user needs to create associated perceptions of PV.

7.8 Study Limitations

The study examined antecedents to e-Gov adoption and the creation of PV in Pakistan, and it has its own culture, history, and specific socio-economic dynamics. Consequently, while the policy and practice framework (Figure 6.14) and conceptual framework of the study (Figure 7.1) identifies key constructs to examine e-Gov and PV across other emerging economies, the context-specific issues for e-Gov adoption and realisation of PV may not be generalisable to these other contexts and countries. Rather, the framework will need to be tested and adapted to each national context.

Secondly, due to time, resources and other COVID-19-related practical constraints, the online survey conducted for quantitative data collection used a non-probability sampling technique. Therefore, the survey sample logically only represents people who had the ability to access and use online platforms, and as such the findings only represent views of a small segment of the population. Wider issues and insights related to the many different strata of users may consequently have been restricted due to this specific limitation.

Finally, the primary technology artefact employed in the study is mobile-based e-Gov applications and being an online survey, participation was not restricted to any specific e-Gov application. This approach was useful as it allowed the researcher to capture a diverse set of user experiences. However, it also means participants may have used different applications – albeit remaining within the domain of e-Gov, therefore results are not specific to any e-Gov service, rather they depict an overall e-Gov picture.

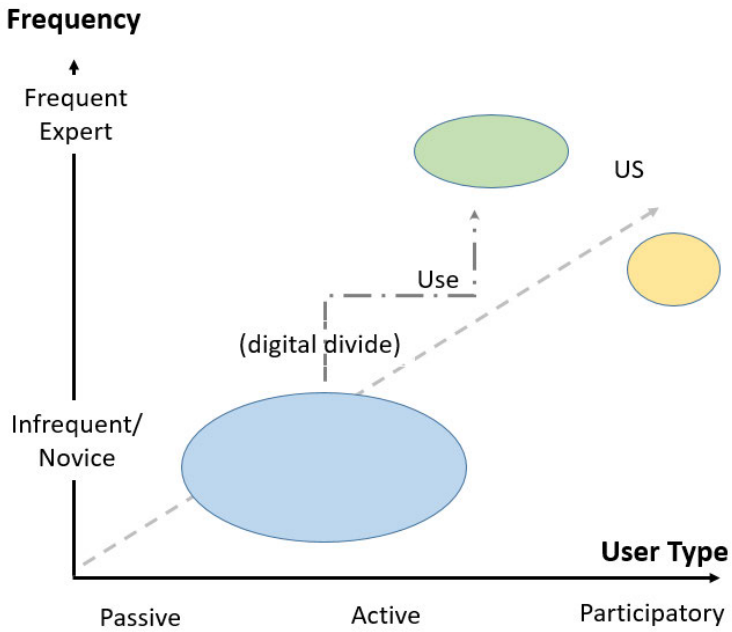
7.9 Future Research

The current study is a static snapshot of the antecedents to e-Gov adoption and the creation of PV in an emerging economy context. A longitudinal study measuring the relative effects of specific policy and practice interventions may yield valuable insights. Similarly, reflecting the earlier noted limitation is sampling, future studies employing probability sampling with varied participation will be useful to incorporate the views of a wider representation of the population. Furthermore, future studies can be conducted to validate the revised conceptual framework (Fig 7.1) developed in this study.

Moreover, as emerged from analysis of QUAN and QUAL data, different user groups exist within the population (see an illustration of in Figure 7.2). These groups emerge from diverse socio-economic backgrounds as measured by subjective socio-economic status (SES) in this study or are a result of prevalent digital divides in the society. These groups arguably may have varied perceptions of PV and it may be interesting to examine specific antecedent characteristics that shape value perceptions of these groups.

Future studies may focus on user needs and level of usage that Fig 7.2 broadly attempts to illustrate. Thus, for example, the largest user group (blue circle) could be described as novice users by frequency of use and passive by user type. Conversely, a very small group (yellow circle) could be described as relative experts in technology uptake and participatory in use type. This figure is an illustration only, as the data analysis was focused on addressing the stated hypotheses.

Figure 7.2: Illustrative user groups



Furthermore, from an SDG perspective, e-Gov is a tool to bridge the apparent gender divide in order to empower women (UNDP 2008). Arguably, women are disproportionately represented in terms of e-Gov participation, especially so in developing countries. In this study too, we witnessed limited participation by women as evident from the demographics of the participants. As also acknowledged by UN, there is limited policy focus in terms of differentiated access and impact of e-Gov for women (UN Economic and Social Commission for Asia and the Pacific 2016). Therefore, future studies to unpack factors that enable or constrain women in e-Gov uptake and participation, as well as PV creation specific to women, may be useful.

Finally, in terms of analytical methods, this study employed individual technology readiness dispositions as a predictor of e-Gov use and user satisfaction. In any future study, another area of policy interest is the examination of mediating and moderating role of individual technology readiness dispositions on e-Gov uptake and PV creation.

7.10 Closing Remarks

Electronic communication and related ICT systems are now entrenched into our daily lives. The fundamental and pervasive nature of ICT was succinctly captured by the CEO of the Turkish mobile operator Turkcell, while speaking at World Economic Forum. He noted that:

"*the first thing a refugee asks for upon arrival at a camp is not water or food, but the Wi-Fi password*" (Carassava 2018).

Following the lead of the private sector, governments have recognised the importance of ICT enabled e-Gov services, albeit this has been somewhat delayed in emerging economies. The effectiveness of these efforts has, however, been problematic with many governments, particularly in emerging economies such as Pakistan, appearing to be stuck in a quagmire described as the e-Gov paradox. As this study suggests the impasse is in a large part the result of misplaced policies and priorities driven by an overwhelming supply-side focus on implementation. The evidence, nonetheless, is that while a supply-side intervention is necessary, alone it is not sufficient. Rather, this study suggests a focus on e-Gov uptake (as distinct to adoption), and the creation of PV, both of which depend on demand-side considerations determined principally by satisfaction of user (citizen) needs.

==== End of Thesis ====

References

Ab Halim, N 2012, 'Technology Readiness and Users Satisfaction Towards Self-Service Technology at Malaysian Airport', *Information Management and Business Review*, vol. 4, no. 8, pp. 453-60.

Aboelmaged, MG 2014, 'Predicting E-Readiness at Firm-Level: An Analysis of Technological, Organizational and Environmental (Toe) Effects on E-Maintenance Readiness in Manufacturing Firms', *International Journal of Information Management*, vol. 34, no. 5, pp. 639-51.

ADB 2021, *Poverty Data: Pakistan*, viewed 18-Sep-21 2021, <https://www.adb.org/countries/pakistan/poverty#accordion-0-0>.

Adler, N & Stewart, J 2007, 'The Macarthur Scale of Subjective Social Status', *San Francisco: MacArthur Research Network on SES & Health*.

Agarwal, R & Prasad, J 1998, 'The Antecedents and Consequents of User Perceptions in Information Technology Adoption', *Decision Support Systems*, vol. 22, no. 1, pp. 15-29.

Agbabiaka, O 2018, 'The Public Value Creation of Egovernment: An Empirical Study from Citizen Perspective', in *Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance*, Galway, Ireland, pp. 143-53.

Agbabiaka, O & Ugaddan, R 2016, 'The Public Value Creation of Egovernment: A Test of the Respecified Is Success Model', in *2016 49th Hawaii International Conference on System Sciences (HICSS)*, Koloa, HI, USA, pp. 2923-32.

Ahmad, MO, Markkula, J & Oivo, M 2012, 'Factors Influencing the Adoption of E-Government Services in Pakistan', in *European, Mediterranean & Middle Eastern Conference on Information Systems*, Munich, Germany, vol. 2012, pp. 118-33.

Ajzen, I 1985, 'From Intentions to Actions: A Theory of Planned Behavior', in *Action Control*, Springer, pp. 11-39.

—— 1991, 'The Theory of Planned Behavior', *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179-211.

Akhlaq, M 2021, 'Cybercrime in Pakistan: A Study of the Law Dealing with Cybercrimes in Pakistan', *PCL Student Journal of Law*.

Akter, S, D'ambra, J & Ray, P 2011, 'An Evaluation of Pls Based Complex Models: The Roles of Power Analysis, Predictive Relevance and Gof Index', paper presented to Proceedings of the Seventeenth Americas Conference on Information Systems, Detroit, Michigan.

Akter, S, Ray, P & D'Ambra, J 2011, 'Viewing Systems as Services: The Role of Service Quality', in *International Conference on Information Systems (ICIS2011)*, Shanghai, China.

Al-Hujran, O, Al-Debei, MM, Chatfield, A & Migdadi, M 2015, 'The Imperative of Influencing Citizen Attitude toward E-Government Adoption and Use', *Computers in Human Behavior*, vol. 53, pp. 189-203.

Al-Shbail, T & Aman, A 2018, 'E-Government and Accountability: How to Mitigate the Disorders and Dysfunctions of Accountability Relationships', *Transforming Government: People, Process and Policy*, vol. 12, no. 2, pp. 155-90.

Al-Shuaili, S, Ali, M, Jaharadak, AA & Al-Shekly, M 2019, 'An Investigate on the Critical Factors That Can Affect the Implementation of E-Government in Oman', in *2019 IEEE 15th International Colloquium on Signal Processing & Its Applications (CSPA)*, pp. 75-9.

Al Mansoori, KA, Sarabdeen, J & Tchantchane, AL 2018, 'Investigating Emirati Citizens' Adoption of E-Government Services in Abu Dhabi Using Modified Utaut Model', *Information Technology & People*, vol. 31, no. 2, pp. 455-81.

Alateyah, S, Crowder, RM & Wills, GB 2012, 'Citizen Adoption of E-Government Services', in *International Conference on Information Society (i-Society 2012)*, pp. 182-7.

AlAwadhi, S & Morris, A 2008, 'The Use of the Utaut Model in the Adoption of E-Government Services in Kuwait', in *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)*, pp. 219.

Alawneh, A, Al-Refai, H & Batiha, K 2013, 'Measuring User Satisfaction from E-Government Services: Lessons from Jordan', *Government Information Quarterly*, vol. 30, no. 3, pp. 277-88.

Aleem, Y, Tariq, M, Umar, M, Rafique, MZ & Ashraf, MU 2021, 'Protecting Online Privacy in Pakistan', *PalArch's Journal of Archaeology of Egypt/Egyptology*, vol. 18, no. 6, pp. 607-15.

Alharbi, A & Sohaib, O 2021, 'Technology Readiness and Cryptocurrency Adoption: Pls-Sem and Deep Learning Neural Network Analysis', *IEEE Access*, vol. 9, pp. 21388-94.

Almutairi, H & Subramanian, GH 2005, 'An Empirical Application of the Delone and Mclean Model in the Kuwaiti Private Sector', *Journal of Computer Information Systems*, vol. 45, no. 3, pp. 113-22.

Alomari, MK 2016, 'E-Voting Adoption in a Developing Country', *Transforming Government: People, Process and Policy*, vol. 10, no. 4, pp. 526-47.

Alotaibi, R, Houghton, L & Sandhu, K 2017, 'Factors Influencing Users‟ Intentions to Use Mobile Government Applications in Saudi Arabia: TAM Applicability', *International Journal Of Advanced Computer Science and Applications*, vol. 8, no. 7, pp. 200-11.

Alshawi, S & Alalwany, H 2009, 'E-Government Evaluation: Citizen's Perspective in Developing Countries', *Information Technology for Development*, vol. 15, no. 3, pp. 193-208.

Alshehri, M & Drew, S 2010, 'E-Government Fundamentals', in *IADIS International Conference ICT, Society and Human Beings*, Freiburg, Germany.

Alzahrani, L, Al-Karaghouli, W & Weerakkody, V 2017, 'Analysing the Critical Factors Influencing Trust in E-Government Adoption from Citizens' Perspective: A Systematic Review and a Conceptual Framework', *International Business Review*, vol. 26, no. 1, pp. 164-75.

Amagoh, F 2016, 'Determinants of E-Government Diffusion in Nigeria: An Examination of Theoretical Models', *Information Development*, vol. 32, no. 4, pp. 1137-54.

Amaro, S, Abrantes, JL & Seabra, C 2015, 'Comparing Cb-SEM and PLS-SEM Results: An Empirical Example', in *2nd International Symposium on Partial Least Squares Path Modeling*, Seville, Spain.

Andersen, KV & Henriksen, HZ 2006, 'E-Government Maturity Models: Extension of the Layne and Lee Model', *Government Information Quarterly*, vol. 23, no. 2, pp. 236-48.

Antonio, A & Tuffley, D 2014, 'The Gender Digital Divide in Developing Countries', *Future Internet*, vol. 6, no. 4, pp. 673-87.

Arfeen, MI, Iqbal, J & Mushtaq, MJ 2017, 'Model for E-Government Implementation in Pakistan', in *Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance*, New Delhi, India.

Armenakis, AA & Bedeian, AG 1999, 'Organizational Change: A Review of Theory and Research in the 1990s', *Journal of Management*, vol. 25, no. 3, pp. 293-315.

Armstrong, G, Adam, S, Denize, S & Kotler, P 2014, *Principles of Marketing*, Pearson Australia.

Awa, HO, Eze, SC, Urieto, JE & Inyang, BJ 2011, 'Upper Echelon Theory (UET) a Major Determinant of Information Technology (IT) Adoption by SMEs in Nigeria', *Journal of Systems and Information Technology*, vol. 13, no. 2, pp. 144-62.

Awa, HO, Ojiabo, OU & Emecheta, BC 2015, 'Integrating TAM, TPB and TOE Frameworks and Expanding Their Characteristic Constructs for E-Commerce Adoption by Smes', *Journal of Science & Technology Policy Management*, vol. 6, no. 1, pp. 76-94.

Baheer, BA, Lamas, D & Sousa, S 2020, 'A Systematic Literature Review on Existing Digital Government Architectures: State-of-the-Art, Challenges, and Prospects', *Administrative Sciences*, vol. 10, no. 2, p. 25.

Bannister, F & Connolly, R 2014, 'ICT, Public Values and Transformative Government: A Framework and Programme for Research', *Government Information Quarterly*, vol. 31, no. 1, pp. 119-28.

—— 2015, 'The Great Theory Hunt: Does E-Government Really Have a Problem?', *Government Information Quarterly*, vol. 32, no. 1, pp. 1-11.

Barclay, D, Higgins, C & Thompson, R 1995, *The Partial Least Squares (PLS) Approach to Casual Modeling: Personal Computer Use as an Illustration*, Walter de Gruyter, New York.

Barua, M 2012, 'E-Governance Adoption in Government Organization of India', *International Journal of Managing Public Sector Information and Communication Technologies*, vol. 3, no. 1, pp. 11-21.

Baxter, R 2009, 'Reflective and Formative Metrics of Relationship Value: A Commentary Essay', *Journal of Business Research*, vol. 62, no. 12, pp. 1370-7.

Bazeley, P & Jackson, K 2013, *Qualitative Data Analysis with NVivo*, 3 edn, SAGE Publications Ltd, US.

Bearfield, DA & Bowman, AOM 2017, 'Can You Find It on the Web? An Assessment of Municipal E-Government Transparency', *The American Review of Public administration*, vol. 47, no. 2, pp. 172-88.

Becker, J-M, Klein, K & Wetzels, M 2012, 'Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models', *Long Range Planning*, vol. 45, no. 5-6, pp. 359-94.

Bélanger, F & Carter, L 2008, 'Trust and Risk in E-Government Adoption', *The Journal of Strategic Information Systems*, vol. 17, no. 2, pp. 165-76.

—— 2012, 'Digitizing Government Interactions with Constituents: An Historical Review of E-Government Research in Information Systems', *Journal of the Association for Information Systems*, vol. 13, no. 5, p. 363.

Bell, E, Bryman, A & Harley, B 2018, *Business Research Methods*, Oxford university press.

Benavides, AD, Nukpezah, J, Keyes, LM & Soujaa, I 2021, 'Adoption of Multilingual State Emergency Management Websites: Responsiveness to the Risk Communication Needs of a Multilingual Society', *International Journal of Public Administration*, vol. 44, no. 5, pp. 409-19.

Benn, S, Edwards, M & Williams, T 2014, *Organizational Change for Corporate Sustainability*, Routledge.

Berkowsky, RW, Sharit, J & Czaja, SJ 2017, 'Factors Predicting Decisions About Technology Adoption among Older Adults', *Innovation in Aging*, vol. 1, no. 3, p. igy002.

Bernerth, J 2004, 'Expanding Our Understanding of the Change Message', *Human Resource Development Review*, vol. 3, no. 1, pp. 36-52.

Berntzen, L 2014, 'Electronic Government Service Efficiency: How to Measure Efficiency of Electronic Services', in *Measuring E-Government Efficiency*, Springer, pp. 75-92.

Beynon-Davies, P 2005, 'Constructing Electronic Government: The Case of the UK Inland Revenue', *International Journal of Information Management*, vol. 25, no. 1, pp. 3-20.

Bharati, P & Chaudhury, A 2004, 'An Empirical Investigation of Decision-Making Satisfaction in Web-Based Decision Support Systems', *Decision Support Systems*, vol. 37, no. 2, pp. 187-97.

Blut, M & Wang, C 2020, 'Technology Readiness: A Meta-Analysis of Conceptualizations of the Construct and Its Impact on Technology Usage', *Journal of the Academy of Marketing Science*, vol. 48, no. 4, pp. 649-69.

Blut, M, Wang, C & Schoefer, K 2016, 'Factors Influencing the Acceptance of Self-Service Technologies: A Meta-Analysis', *Journal of Service Research*, vol. 19, no. 4, pp. 396-416.

Boateng, GO, Neilands, TB, Frongillo, EA, Melgar-Quiñonez, HR & Young, SL 2018, 'Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer', *Frontiers in Public Health*, vol. 6, p. 149.

Bosman, I 2021, '*COVID-19 and E-Governance: Lessons from South Africa* by South African Institute of International Affairs.

Bourque, LB, Clark, VA & Clark, V 1992, *Processing Data: The Survey Example*, Sage.

Bowen, S & Zwi, AB 2005, 'Pathways to "Evidence-Informed" Policy and Practice: A Framework for Action', *PLoS Medicine*, vol. 2, no. 7, p. e166.

Bradley, RV, Pridmore, JL & Byrd, TA 2006, 'Information Systems Success in the Context of Different Corporate Cultural Types: An Empirical Investigation', *Journal of Management Information Systems*, vol. 23, no. 2, pp. 267-94.

Brannick, T & Coghlan, D 2007, 'In Defense of Being "Native": The Case for Insider Academic Research', *Organizational Research Methods*, vol. 10, no. 1, pp. 59-74.

Braun, V & Clarke, V 2006, 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101.

Brewer, B 2007, 'Citizen or Customer? Complaints Handling in the Public Sector', *International Review of Administrative Sciences*, vol. 73, no. 4, pp. 549-56.

Brown, TA 2015, *Confirmatory Factor Analysis for Applied Research*, Guilford publications.

Bryson, JM, Crosby, BC & Bloomberg, L 2014, 'Public Value Governance: Moving Beyond Traditional Public Administration and the New Public Management', *Public Administration Review*, vol. 74, no. 4, pp. 445-56.

Burnes, B 2015, 'Understanding Resistance to Change–Building on Coch and French', *Journal of Change Management*, vol. 15, no. 2, pp. 92-116.

Burnes, B & Jackson, P 2011, 'Success and Failure in Organizational Change: An Exploration of the Role of Values', *Journal of Change Management*, vol. 11, no. 2, pp. 133-62.

Byrd, TA, Thrasher, EH, Lang, T & Davidson, NW 2006, 'A Process-Oriented Perspective of IS Success: Examining the Impact of IS on Operational Cost', *Omega*, vol. 34, no. 5, pp. 448-60.

Carassava, A 2018, 'Refugees Ask for Wifi First, Food and Shelter Second', *The Times*, <https://www.thetimes.co.uk/article/refugees-ask-for-wifi-first-food-and-shelter-second-fp6qc9lcb>.

Carter, L & Bélanger, F 2005, 'The Utilization of E-Government Services: Citizen Trust, Innovation and Acceptance Factors', *Information Systems Journal*, vol. 15, no. 1, pp. 5-25.

Carter, L, Weerakkody, V, Phillips, B & Dwivedi, YK 2016, 'Citizen Adoption of E-Government Services: Exploring Citizen Perceptions of Online Services in the United States and United Kingdom', *Information Systems Management*, vol. 33, no. 2, pp. 124-40.

Castelnovo, W 2010, 'Is There an Egovernment Paradox', in *10th European eGovernment Conference on eGovernment*, Limerick, Ireland, pp. 90-8.

—— 2013, 'A Stakeholder Based Approach to Public Value', in *Proceedings of 13th European conference on Egovernment*, Varese, Italy, pp. 94-101.

Chakravorti, B 2021, *How to Close the Digital Divide in the U.S.*, <https://hbr.org/2021/07/how-to-close-the-digital-divide-in-the-u-s>.

Chen, FF, Sousa, KH & West, SG 2005, 'Teacher's Corner: Testing Measurement Invariance of Second-Order Factor Models', *Structural Equation Modeling*, vol. 12, no. 3, pp. 471-92.

Chen, H, Brandt, L, Gregg, V, Traunmüller, R, Dawes, S, Hovy, E, Macintosh, A & Larson, CA 2007, *Digital Government: E-Government Research, Case Studies, and Implementation*, vol. 17, Springer Science & Business Media.

Chen, JV, Jubilado, RJM, Capistrano, EPS & Yen, DC 2015, 'Factors Affecting Online Tax Filing–an Application of the IS Success Model and Trust Theory', *Computers in Human Behavior*, vol. 43, pp. 251-62.

Chen, S-C, Liu, M-L & Lin, C-P 2013, 'Integrating Technology Readiness into the Expectation–Confirmation Model: An Empirical Study of Mobile Services', *Cyberpsychology, Behavior, and Social Networking*, vol. 16, no. 8, pp. 604-12.

Chen, Y-C 2012, 'A Comparative Study of E-Government XBRL Implementations: The Potential of Improving Information Transparency and Efficiency', *Government Information Quarterly*, vol. 29, no. 4, pp. 553-63.

Chin, WW 1998a, *Commentary: Issues and Opinion on Structural Equation Modeling*, JSTOR, 0276-7783.

—— 1998b, 'The Partial Least Squares Approach to Structural Equation Modeling', *Modern Methods for Business Research*, vol. 295, no. 2, pp. 295-336.

—— 2010, 'How to Write up and Report PLS Analyses', in *Handbook of Partial Least Squares*, Springer, pp. 655-90.

Chin, WW & Newsted, PR 1999, 'Structural Equation Modeling Analysis with Small Samples Using Partial Least Squares', *Statistical Strategies for Small Sample Research*, vol. 1, no. 1, pp. 307-41.

Chohan, SR & Hu, G 2020a, 'Strengthening Digital Inclusion through E-Government: Cohesive Ict Training Programs to Intensify Digital Competency', *Information Technology for Development*, pp. 1-23.

—— 2020b, 'Success Factors Influencing Citizens' Adoption of IOT Service Orchestration for Public Value Creation in Smart Government', *IEEE Access*, vol. 8, pp. 208427-48.

Choudhary, MA, Khan, N, Abbas, A & Salman, A 2008, 'Telecom Sector Deregulation, Business Growth and Economic Development', in *Portland International Conference on Management of Engineering & Technology*, Cape Town, South Africa, pp. 2648-56.

Chun, S, Luna-Reyes, LF & Sandoval-Almazán, R 2012, 'Collaborative E-Government', *Transforming Government: People, Process and Policy*, vol. 6, no. 1, pp. 5-12.

Ciborra, CU 2009, 'Interpreting E-Government and Development: Efficiency, Transparency or Governance at a Distance?', in *Bricolage, Care and Information*, Springer, pp. 90-110.

Codagnone, C 2007, 'Measuring Egovernment: Reflections from EGEP Measurement Framework Experience', *European Review of Political Technologies*, vol. 4, pp. 89-106.

Coghlan, D & Brydon-Miller, M 2014, *The Sage Encyclopedia of Action Research*, Sage.

Cohen, J 2013, *Statistical Power Analysis for the Behavioral Sciences*, 2e, Academic press.

Coltman, T, Devinney, TM, Midgley, DF & Venaik, S 2008, 'Formative Versus Reflective Measurement Models: Two Applications of Formative Measurement', *Journal of Business Research*, vol. 61, no. 12, pp. 1250-62.

Connolly, R, Bannister, F & Kearney, A 2010, 'Government Website Service Quality: A Study of the Irish Revenue Online Service', *European Journal of Information Systems*, vol. 19, no. 6, pp. 649-67.

Cook, M & Harrison, TM 2015, 'Using Public Value Thinking for Government IT Planning and Decision Making: A Case Study', *Information Polity*, vol. 20, no. 2, 3, pp. 183-97.

Cordella, A & Bonina, CM 2012, 'A Public Value Perspective for Ict Enabled Public Sector Reforms: A Theoretical Reflection', *Government Information Quarterly*, vol. 29, no. 4, pp. 512-20.

Cordella, A & Tempini, N 2015, 'E-Government and Organizational Change: Reappraising the Role of ICT and Bureaucracy in Public Service Delivery', *Government Information Quarterly*, vol. 32, no. 3, pp. 279-86.

Corsi, M & D'Ippoliti, C 2010, 'The Productivity of the Public Sector in OECD Countries: Egovernment as Driver of Efficiency and Efficacy'.

Coursey, D & Norris, DF 2008, 'Models of E-Government: Are They Correct? An Empirical Assessment', *Public Administration Review*, vol. 68, no. 3, pp. 523-36.

Creswell, J 2014, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 4 edn, SAGE Publications Ltd, US.

Dada, D 2006, 'The Failure of E-Government in Developing Countries: A Literature Review', *The Electronic Journal of Information Systems in Developing Countries*, vol. 26, no. 1, pp. 1-10.

Das, RK, Panda, M & Misra, H 2020, 'Decision Support Grievance Redressal System Using Sentence Sentiment Analysis', in *Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance*, pp. 17-24.

Davis, FD 1989, 'Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology', *MIS Quarterly*, pp. 319-40.

Dawes, SS & Helbig, N 2010, 'Information Strategies for Open Government: Challenges and Prospects for Deriving Public Value from Government Transparency', in *International Conference on Electronic Government*, pp. 50-60.

Debri, F & Bannister, F 2015, 'E-Government Stage Models: A Contextual Critique', in *2015 48th Hawaii International Conference on System Sciences*, pp. 2222-31.

Deloitte 2015, *Digital Government Transformation*, <https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-economics-digital-government-transformation-230715.pdf>.

DeLone, WH & McLean, ER 1992, 'Information Systems Success: The Quest for the Dependent Variable', *Information Systems Research*, vol. 3, no. 1, pp. 60-95.

—— 2003, 'The Delone and Mclean Model of Information Systems Success: A Ten-Year Update', *Journal of Management Information Systems*, vol. 19, no. 4, pp. 9-30.

Desai, SC & Reimers, S 2019, 'Comparing the Use of Open and Closed Questions for Web-Based Measures of the Continued-Influence Effect', *Behavior Research Methods*, vol. 51, no. 3, pp. 1426-40.

DGA 2021, *Digital Government Authority*
Innovating Beyond the Horizon to Build the Future of Digital Government, viewed 2-Nov-21 2021, <https://dga.gov.sa/en/>.

Di Maio, AB, Christopher H 2000, 'Gartner's Four Phases of E-Government Model', viewed 15-July-21 2020 <https://www.gartner.com/en/documents/317292>.

Dollah, S, Abduh, A & Rosmaladewi, M 2017, 'Benefits and Drawbacks of NVivo QSR Application', in *2nd International Conference on Education, Science, and Technology (ICEST 2017,* Makassar, Indonesia.

Dong, Y & Peng, C-YJ 2013, 'Principled Missing Data Methods for Researchers', *SpringerPlus*, vol. 2, no. 1, pp. 1-17.

Dorothea, HAG 2013, 'Transparency, E-Government, and Accountability: Some Issues and Considerations', *Public Performance & Management Review*, pp. 562-84.

Douglas, S & Meijer, A 2016, 'Transparency and Public Value—Analyzing the Transparency Practices and Value Creation of Public Utilities', *International Journal of Public Administration*, vol. 39, no. 12, pp. 940-51.

DTA 2021, *Simple, Clear and Fast Public Services*, viewed 2-Nov-2021 2021, <https://www.dta.gov.au/>.

Duho, KC, Amankwa, MO & Musah-Surugu, JI 2020, 'Determinants and Convergence of Government Effectiveness in Africa and Asia', *Public Administration and Policy*, Vol 23, no 2, pp 199-215.

Dukić, D, Dukić, G & Bertović, N 2017, 'Public Administration Employees' Readiness and Acceptance of E-Government: Findings from a Croatian Survey', *Information Development*, vol. 33, no. 5, pp. 525-39.

European Commission 2019, 'Digital Government Factsheet 2019' < https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government _Factsheets_ UK_2019.pdf>.

Farooq, MS, Feroze, N & Kai, YT 2017, 'Public Vs Private Quality Education at Primary Level in Pakistan', *International Online Journal of Primary Education*, vol. 6, no. 2, pp. 1-23.

Farrell, AM 2010, 'Insufficient Discriminant Validity: A Comment on Bove, Pervan, Beatty, and Shiu (2009)', *Journal of Business Research*, vol. 63, no. 3, pp. 324-7.

Fath-Allah, A, Cheikhi, L, Al-Qutaish, RE & Idri, A 2014, 'E-Government Maturity Models: A Comparative Study', *International Journal of Software Engineering & Applications*, vol. 5, no. 3, pp. 71-91.

Fayad, R & Paper, D 2015, 'The Technology Acceptance Model E-Commerce Extension: A Conceptual Framework', *Procedia Economics and Finance*, vol. 26, pp. 1000-6.

Felix, R 2017, 'Service Quality and Customer Satisfaction in Selected Banks in Rwanda', *Journal of Business & Financial Affairs*, vol. 6, no. 1, pp. 1-11.

Ferreira, JB, da Rocha, A & da Silva, JF 2014, 'Impacts of Technology Readiness on Emotions and Cognition in Brazil', *Journal of Business Research*, vol. 67, no. 5, pp. 865-73.

Finance Division 2020, *Federal Budget 2020-21 Budget in Brief*.

Fishbein, M & Ajzen, I 1977, 'Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research'.

Fisk, RP, Patricio, L, Lin, JSC & Chang, HC 2011, 'The Role of Technology Readiness in Self-Service Technology Acceptance', *Managing Service Quality: An International Journal*.

Flak, LS, Eikebrokk, TR & Dertz, W 2008, 'An Exploratory Approach for Benefits Management in E-Government: Insights from 48 Norwegian Government Funded Projects', in *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)*, Hawaii, US, pp. 210.

Floridi, L 2013, 'Information Quality', *Philosophy & Technology*, vol. 26, no. 1, pp. 1-6.

Floropoulos, J, Spathis, C, Halvatzis, D & Tsipouridou, M 2010, 'Measuring the Success of the Greek Taxation Information System', *International Journal of Information Management*, vol. 30, no. 1, pp. 47-56.

Fornell, C & Larcker, DF 1981, 'Evaluating Structural Equation Models with Unobservable Variables and Measurement Error', *Journal of Marketing Research*, vol. 18, no. 1, pp. 39-50.

Forsgren, N, Durcikova, A, Clay, PF & Wang, X 2016, 'The Integrated User Satisfaction Model: Assessing Information Quality and System Quality as Second-Order Constructs in System Administration', *Communications of the Association for Information Systems*, vol. 38, pp. 803-39.

Freeze, RD, Alshare, KA, Lane, PL & Wen, HJ 2010, 'Is Success Model in E-Learning Context Based on Students' Perceptions', *Journal of Information systems education*, vol. 21, no. 2, pp. 173-84.

Fu, J-R, Farn, C-K & Chao, W-P 2006, 'Acceptance of Electronic Tax Filing: A Study of Taxpayer Intentions', *Information & Management*, vol. 43, no. 1, pp. 109-26.

Gable, G, Sedera, D & Chan, T 2003, 'Enterprise Systems Success: A Measurement Model', *ICIS 2003 Proceedings*, p. 48.

Gable, GG, Sedera, D & Chan, T 2008, 'Re-Conceptualizing Information System Success: The IS-Impact Measurement Model', *Journal of the Association for Information Systems*, vol. 9, no. 7, p. 18.

Gable, M 2015, 'Efficiency, Participation, and Quality: Three Dimensions of E-Government?', *Social Science Computer Review*, vol. 33, no. 4, pp. 519-32.

Gallo, C, Giove, M, Millard, J & Thaarup, R 2014, 'Study on Egovernment and the Reduction of Administrative Burden', *Brussels: European Commission*.

Gangwar, H, Date, H & Ramaswamy, R 2015, 'Understanding Determinants of Cloud Computing Adoption Using an Integrated Tam-Toe Model', *Journal of Enterprise Information Management*, vol. 28, no. 1, pp. 107-30.

Gangwar, H, Date, H & Raoot, A 2014, 'Review on IT Adoption: Insights from Recent Technologies', *Journal of Enterprise Information Management*, vol. 27, no. 4, pp. 488-502.

Gao, L & Bai, X 2014, 'An Empirical Study on Continuance Intention of Mobile Social Networking Services', *Asia Pacific Journal of Marketing and Logistics*.

Garrity, EJ, Glassberg, B, Kim, YJ, Sanders, GL & Shin, SK 2005, 'An Experimental Investigation of Web-Based Information Systems Success in the Context of Electronic Commerce', *Decision Support Systems*, vol. 39, no. 3, pp. 485-503.

Gauld, R, Goldfinch, S & Horsburgh, S 2010, 'Do They Want It? Do They Use It? The 'Demand-Side'of E-Government in Australia and New Zealand', *Government Information Quarterly*, vol. 27, no. 2, pp. 177-86.

Gebbia, J 2016, *How Airbnb Designs for Trust*.

Gefen, D & Straub, D 2005, 'A Practical Guide to Factorial Validity Using PLS-Graph: Tutorial and Annotated Example', *Communications of the Association for Information systems*, vol. 16, no. 1, p. 5.

Gefen, D, Warkentin, M, Pavlou, P & Rose, G 2002, 'Egovernment Adoption', *Americas Conference on Information Systems (AMCIS) 2002 Proceedings*, Dallas, US p. 83.

Ghobakhloo, M, Hong, TS & Standing, C 2014, 'Business-to-Business Electronic Commerce Success: A Supply Network Perspective', *Journal of Organizational Computing and Electronic Commerce*, vol. 24, no. 4, pp. 312-41.

Ghobakhloo, M & Tang, SH 2015, 'Information System Success among Manufacturing Smes: Case of Developing Countries', *Information Technology for Development*, vol. 21, no. 4, pp. 573-600.

Gill, P, Stewart, K, Treasure, E & Chadwick, B 2008, 'Methods of Data Collection in Qualitative Research: Interviews and Focus Groups', *British Dental Journal*, vol. 204, no. 6, pp. 291-5.

Godoe, P & Johansen, T 2012, 'Understanding Adoption of New Technologies: Technology Readiness and Technology Acceptance as an Integrated Concept', *Journal of European Psychology Students*, vol. 3, no. 1.

GOP 2021, *Ehsas Programme*, viewed 18-Sep-21 2021, <https://pakistan.gov.pk/ehsaas-program.html>.

Gounopoulos, E, Kontogiannis, S, Kazanidis, I & Valsamidis, S 2020, 'The Impact of the Digital Divide on the Adoption of E-Government in Greece', *KnE Social Sciences*, pp. 401–11.

PMs Secretariat 2008, *Report of the National Commission for Government Reforms on Reforming the Government in Pakistan*, by Government of Pakistan, <https://www.pc.gov.pk/uploads/report/NCGR_Vol_I-1.pdf>.

MoI Telecom 2018a, *Digital Pakistan Policy* by Government of Pakistan

2018b, *Digital Pakistan Policy*, by Government of Pakistan.

Graafland, J & Smid, H 2019, 'Decoupling among CSR Policies, Programs, and Impacts: An Empirical Study', *Business & Society*, vol. 58, no. 2, pp. 231-67.

Gregory, G 2007, 'E-Government', *Encyclopedia of Political Communications. Los Angeles*.

Grönlund, Å & Horan, TA 2005, 'Introducing E-Gov: History, Definitions, and Issues', *Communications of the Association for Information Systems*, vol. 15, no. 1, p. 39.

Guermazi, B & Satola, D 2005, 'Creating the "Right" Enabling Environment for ICT', *E-Development: From Excitement to Effectiveness*, pp. 23-46.

Guest, G, Bunce, A & Johnson, L 2006, 'How Many Interviews Are Enough? An Experiment with Data Saturation and Variability', *Field Methods*, vol. 18, no. 1, pp. 59-82.

Gunawong, P & Gao, P 2017, 'Understanding E-Government Failure in the Developing Country Context: A Process-Oriented Study', *Information Technology for Development*, vol. 23, no. 1, pp. 153-78.

Gupta, KP & Maurya, H 2020, 'The Role of Access Convenience of Common Service Centres (CCSS) in the Continued Use of E-Government', *Digital Policy, Regulation and Governance*.

Gupta, KP, Singh, S & Bhaskar, P 2016, 'Citizen Adoption of E-Government: A Literature Review and Conceptual Framework', *Electronic Government, an International Journal*, vol. 12, no. 2, pp. 160-85.

Haider, Z, Shah, A & Chachar, AA 2017, 'Citizens' Adoption of Electronic Government in Pakistan by Improving Technology Acceptance Model', *The Government-Annual Research Journal of Political Science.*, vol. 5, no. 5.

Haider, Z, Shuwen, C, Lalani, F & Mangi, AA 2015, 'Adoption of E-Government in Pakistan: Supply Perspective', *International Journal Of Advanced Computer Science and Applications*, vol. 6, no. 6, pp. 55-63.

Hair, JF, Ringle, CM & Sarstedt, M 2011, 'PLS-SEM: Indeed a Silver Bullet', *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139-52.

Hair, JF, Risher, JJ, Sarstedt, M & Ringle, CM 2019, 'When to Use and How to Report the Results of PLS-SEM', *European Business Review*.

Hair, JF, Sarstedt, M, Ringle, CM & Mena, JA 2012, 'An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research', *Journal of the Academy of Marketing Science*, vol. 40, no. 3, pp. 414-33.

Hair, JFJ, Black, WC, Babin, BJ & Anderson, RE 2014, *Multivariate Data Analysis*, Pearson Education Limited.

Hair Jr, JF, Babin, BJ & Krey, N 2017, 'Covariance-Based Structural Equation Modeling in the Journal of Advertising: Review and Recommendations', *Journal of Advertising*, vol. 46, no. 1, pp. 163-77.

Hair Jr, JF, Hult, GTM, Ringle, CM & Sarstedt, M 2014, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Sage publications.

Hair Jr, JF, Matthews, LM, Matthews, RL & Sarstedt, M 2017, 'Pls-Sem or CB-SEM: Updated Guidelines on Which Method to Use', *International Journal of Multivariate Data Analysis*, vol. 1, no. 2, pp. 107-23.

Hair Jr, JF, Sarstedt, M, Ringle, CM & Gudergan, SP 2017, *Advanced Issues in Partial Least Squares Structural Equation Modeling*, Sage publications.

Hall, TE & Owens, J 2011, 'The Digital Divide and E-Government Services', in *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, Tallinn, Estonia, pp. 37-44.

Haller, M, Li, M-H & Mossberger, K 2011, 'Does E-Government Use Contribute to Citizen Engagement with Government and Community?', in *APSA 2011 Annual Meeting Paper,* University of Illinois, Chicago.

Hammarberg, K, Kirkman, M & de Lacey, S 2016, 'Qualitative Research Methods: When to Use Them and How to Judge Them', *Human Reproduction*, vol. 31, no. 3, pp. 498-501.

Hardesty, DM & Bearden, WO 2004, 'The Use of Expert Judges in Scale Development: Implications for Improving Face Validity of Measures of Unobservable Constructs', *Journal of Business Research*, vol. 57, no. 2, pp. 98-107.

Harrison, TM, Guerrero, S, Burke, GB, Cook, M, Cresswell, A, Helbig, N, Hrdinová, J & Pardo, T 2012, 'Open Government and E-Government: Democratic Challenges from a Public Value Perspective', *Information Polity*, vol. 17, no. 2, pp. 83-97.

Harvey, M, Hastings, DP & Chowdhury, G 2021, 'Understanding the Costs and Challenges of the Digital Divide through Uk Council Services', *Journal of Information Science*.

Headley, MG & Plano Clark, VL 2020, 'Multilevel Mixed Methods Research Designs: Advancing a Refined Definition', *Journal of Mixed Methods Research*, vol. 14, no. 2, pp. 145-63.

Heale, R & Twycross, A 2015, 'Validity and Reliability in Quantitative Studies', *Evidence-Based Nursing*, vol. 18, no. 3, pp. 66-7.

Heeks, R 2003a, *Most E-Government-for-Development Projects Fail: How Can Risks Be Reduced?*, vol. 14, Institute for Development Policy and Management, University of Manchester.

—— 2003b, 'Most Egovernment-for-Development Projects Fail: How Can Risks Be Reduced?', (Working paper no 14, Institute for Development Policy and Management, University of Manchester, UK, < https://papers.ssrn.com/sol3/papers.cfm?abstract _id=3540052>.

Heeks, R & Bailur, S 2007, 'Analyzing E-Government Research: Perspectives, Philosophies, Theories, Methods, and Practice', *Government Information Quarterly*, vol. 24, no. 2, pp. 243-65.

Helbig, N, Gil-García, JR & Ferro, E 2009, 'Understanding the Complexity of Electronic Government: Implications from the Digital Divide Literature', *Government Information Quarterly*, vol. 26, no. 1, pp. 89-97.

Henriksen, HZ & Andersen, KV 2008, 'Electronic Records Management Systems Implementation in the Pakistani Local Government', *Records Management Journal*.

Henseler, J 2010, 'On the Convergence of the Partial Least Squares Path Modeling Algorithm', *Computational Statistics*, vol. 25, no. 1, pp. 107-20.

Henseler, J, Ringle, CM & Sinkovics, RR 2009, 'The Use of Partial Least Squares Path Modeling in International Marketing', in *New Challenges to International Marketing*, Emerald Group Publishing Limited.

Hiller, JS & Bélanger, F 2001, 'Privacy Strategies for Electronic Government', *E-Government*, vol. 200, no. 2001, pp. 162-98.

Hood, C 1995, 'The "New Public Management" in the 1980s: Variations on a Theme', *Accounting, Organizations and Society*, vol. 20, no. 2-3, pp. 93-109.

Horst, M, Kuttschreuter, M & Gutteling, JM 2007, 'Perceived Usefulness, Personal Experiences, Risk Perception and Trust as Determinants of Adoption of E-Government Services in the Netherlands', *Computers in Human Behavior*, vol. 23, no. 4, pp. 1838-52.

Hung, S-Y, Chang, C-M, Chen, K, Tang, K-Z & Chou, C-H 2011, 'Buyer Acceptance of G2b E-Government Services: An Empirical Study of Inter-Entity Supply Contracts', *Data Base-for Advances in Information Systems*, vol. 42, no. 4, p. 81.

Ifinedo, P 2011, 'An Empirical Analysis of Factors Influencing Internet/E-Business Technologies Adoption by Smes in Canada', *International Journal of Information Technology & Decision Making*, vol. 10, no. 04, pp. 731-66.

Iivari, J 2005, 'An Empirical Test of the Delone-Mclean Model of Information System Success', *ACM SIGMIS Database: The Database for Advances in Information Systems*, vol. 36, no. 2, pp. 8-27.

Im, T, Cho, W, Porumbescu, G & Park, J 2014, 'Internet, Trust in Government, and Citizen Compliance', *Journal of Public Administration Research and Theory*, vol. 24, no. 3, pp. 741-63.

Imtiaz, SY, Khan, MA & Shakir, M 2015, 'Telecom Sector of Pakistan: Potential, Challenges and Business Opportunities', *Telematics and Informatics*, vol. 32, no. 2, pp. 254-8.

Inclusive Internet Index 2020, *The 2020 Inclusive Internet Index*, <https://www.benton.org/headlines/2020-inclusive-internet-index>.

Ingram, G 2021, 'Bridging the Global Digital Divide: A Platform to Advance Digital Development in Low-and Middle-Income Countries' by Center for Substainable Development at Brookings.

International Telecommunication Union 2020, *Global ICT Regulatory Outlook 2020 Pointing the Way Forward to Collaborative Regulation*, Geneva, Switzerland.

Israel, GD 1992, 'Determining Sample Size', University of Florida Cooperative Extension Service, Institute of Food and Agriculture Sciences, EDIS, Florida.

ITU 1998, *World Telecommunication Development Report*, ITU Geneva.

—— 2018a, *ICT Regulatory Tracker 2018*, International Telecommunication Union, <https://www.itu.int/net4/itu-d/irt/#/about-tracker>.

—— 2018b, *ICT Regulatory Tracker 2018*, viewed 19-January-2020 2020, <https://www.itu.int/net4/itu-d/irt/#/generations-of-regulation>.

Jacob, DW, Fudzee, MFM, Salamat, MA & Herawan, T 2019, 'A Review of the Generic End-User Adoption of E-Government Services', *International Review of Administrative Sciences*, vol. 85, no. 4, pp. 799-818.

Jaeger, PT & Thompson, KM 2003, 'E-Government around the World: Lessons, Challenges, and Future Directions', *Government Information Quarterly*, vol. 20, no. 4, pp. 389-94.

Jaeger, RG & Halliday, TR 1998, 'On Confirmatory Versus Exploratory Research', *Herpetologica*, vol 54, pp. S64-S6.

Jamil, S 2021, 'From Digital Divide to Digital Inclusion: Challenges for Wide-Ranging Digitalization in Pakistan', *Telecommunications Policy*, vol. 45, no. 8, p. 102206.

Jensen, TB & Aanestad, M 2007, 'Hospitality and Hostility in Hospitals: A Case Study of an EPR Adoption Among Surgeons', *European Journal of Information Systems*, vol. 16, no. 6, pp. 672-80.

Jiang, JJ & Klein, G 1999, 'User Evaluation of Information Systems: By System Typology', *IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans*, vol. 29, no. 1, pp. 111-6.

Johnson, RE, Rosen, CC & Chang, C-H 2011, 'To Aggregate or Not to Aggregate: Steps for Developing and Validating Higher-Order Multidimensional Constructs', *Journal of Business and Psychology*, vol. 26, no. 3, pp. 241-8.

Joshi, P 2019, 'A Sustainability-Driven E-Government Maturity Model (SDEGM) from the Perspectives of Developing Countries', University of East London.

Joshi, PR & Islam, S 2018, 'E-Government Maturity Model for Sustainable E-Government Services from the Perspective of Developing Countries', *Sustainability*, vol. 10, no. 6, p. 1882.

Kallemeyn, LM, Hall, JN & Gates, E 2020, 'Exploring the Relevance of Complexity Theory for Mixed Methods Research', *Journal of Mixed Methods Research*, vol 14, no 3, pp. 288-304.

Karacapilidis, N, Loukis, E & Dimopoulos, S 2005, 'Computer-Supported G2G Collaboration for Public Policy and Decision-Making', *Journal of Enterprise Information Management*.

Karunasena, K & Deng, H 2012, 'Critical Factors for Evaluating the Public Value of E-Government in Sri Lanka', *Government Information Quarterly*, vol. 29, no. 1, pp. 76-84.

Kazi, AK & Mannan, MA 2013, 'Factors Affecting Adoption of Mobile Banking in Pakistan', *International Journal of Research in Business and Social Science*, vol. 2, no. 3, pp. 54-61.

Kearns, I 2004, *Public Value and E-Government*, (Working paper, Institute for Public Policy Research, London, 2004) <https://www.ippr.org/files/images/media/files/publication/2011/05/public_value_egovernment_1522.pdf>.

Khan, AH 2018, 'Administrative Efficiency and Effectiveness with the Application of E-Government: A Study on Bangladesh Public Administration', in *User Centric E-Government*, Springer, pp. 105-16, viewed 2017-11-28 22:32:42, via link.springer.com.

Khanra, S & Joseph, RP 2019, 'E-Governance Maturity Models: A Meta-Ethnographic Study', *The International Technology Management Review*, vol. 8, no. 1, pp. 1-9.

Khotami, M 2017, 'The Concept of Accountability in Good Governance', in *International Conference on Democracy, Accountability and Governance (ICODAG 2017)*, Java, Indonesia, pp. 30-3.

Kline, P 2000, *The Handbook of Psychological Testing*, Psychology Press.

Kline, RB 2015, *Principles and Practice of Structural Equation Modeling*, Guilford publications.

Knox, C & Janenova, S 2019a, 'The E-Government Paradox in Post-Soviet Countries', *International Journal of Public Sector Management,* vol 32, no 6, pp 600-15.

—— 2019b, 'Public Management Reforms: One-Stop Shops to Digital Government', in *Oxford Research Encyclopedia of Politics*.

Korpelainen, E 2011, 'Theories of ICT System Implementation and Adoption: A Critical Review' by Aalto University, School of Science, Helsinki.

Kosti, N, Levi-Faur, D & Mor, G 2019, *Legislation and Regulation: Three Analytical Distinctions*, Taylor & Francis, 2050-8840.

Kotter, JP 1996, 'Leading Change. Boston, MA: Harvard Business School Press. Kouzes, JM, & Posner, BZ (2002)', *The leadership challenge. San Francisco, CA*.

Kotze, TG, Anderson, O & Summerfield, K 2016, 'Technophobia: Gender Differences in the Adoption of High-Technology Consumer Products', *South African Journal of Business Management*, vol. 47, no. 1, pp. 21-8.

Kuldosheva, G 2021, '*Challenges and Opportunities of Digital Transformation in the Public Sector in Transition Economies: Examination of the Case of Uzbekistan*', (Working paper, No. 1248, Asian Development Bank Institute, April 2021) < Challenges and Opportunities of Digital Transformation in the Public Sector in Transition Economies: Examination of the Case of Uzbekistan (adb.org)>

Kumar, R, Sachan, A & Mukherjee, A 2018, 'Direct Vs Indirect E-Government Adoption: An Exploratory Study', *Digital Policy, Regulation and Governance*, vol 20, no 2, pp 149-62.

Kumar, V, Mukerji, B, Butt, I & Persaud, A 2007, 'Factors for Successful E-Government Adoption: A Conceptual Framework', *Electronic Journal of E-government*, vol. 5, no. 1, pp 63-76.

Kunstelj, M, Jukić, T & Vintar, M 2007, 'Analysing the Demand Side of E-Government: What Can We Learn from Slovenian Users?', in *International Conference on Electronic Government*, pp. 305-17.

Lai, J-Y 2016, 'E-Servcon and E-Commerce Success: Applying the Delone and Mclean Model', in *Web Design and Development: Concepts, Methodologies, Tools, and Applications*, IGI Global, pp. 816-38.

Lam, SY, Chiang, J & Parasuraman, A 2008, 'The Effects of the Dimensions of Technology Readiness on Technology Acceptance: An Empirical Analysis', *Journal of Interactive Marketing*, vol. 22, no. 4, pp. 19-39.

Laumer, S, Maier, C & Weitzel, T 2017, 'Information Quality, User Satisfaction, and the Manifestation of Workarounds: A Qualitative and Quantitative Study of Enterprise Content Management System Users', *European Journal of Information Systems*, vol. 26, no. 4, pp. 333-60.

Lavrakas, PJ 2008, *Encyclopedia of Survey Research Methods*, Sage Publications.

Lawson-Body, A, Illia, A, Willoughby, L & Lee, S 2014, 'Innovation Characteristics Influencing Veterans' Adoption of E-Government Services', *Journal of Computer Information Systems*, vol. 54, no. 3, pp. 34-44.

Layne, K & Lee, J 2001, 'Developing Fully Functional E-Government: A Four Stage Model', *Government Information Quarterly*, vol. 18, no. 2, pp. 122-36.

Le Blanc, D 2020, 'E-Participation: A Quick Overview of Recent Qualitative Trends' (Working paper, no 163, UN Department of Economic and Social Affairs, New York, US.< https://www.un.org/esa/desa/papers/2020/wp163_2020.pdf>

Leavy, P 2017, *Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches*, Guilford Publications.

Lee, CP, Chang, K & Berry, FS 2011, 'Testing the Development and Diffusion of E-Government and E-Democracy: A Global Perspective', *Public Administration Review*, vol. 71, no. 3, pp. 444-54.

Lee, S & Kim, D-Y 2018, 'The Effect of Hedonic and Utilitarian Values on Satisfaction and Loyalty of Airbnb Users', *International Journal of Contemporary Hospitality Management*, vol 30, no 3, pp 1332-1351.

Lee, V-H, Hew, J-J, Leong, L-Y, Tan, GW-H & Ooi, K-B 2020, 'Wearable Payment: A Deep Learning-Based Dual-Stage SEM-ANN Analysis', *Expert Systems with Applications*, vol. 157, p. 113477.

Li, W 2021, 'The Role of Trust and Risk in Citizens' E-Government Services Adoption: A Perspective of the Extended UTAUT Model', *Sustainability*, vol. 13, no. 14, p. 7671.

Li, Y & Shang, H 2020, 'Service Quality, Perceived Value, and Citizens' Continuous-Use Intention Regarding E-Government: Empirical Evidence from China', *Information & Management*, vol. 57, no. 3, p. 103197.

Liljander, V, Gillberg, F, Gummerus, J & Van Riel, A 2006, 'Technology Readiness and the Evaluation and Adoption of Self-Service Technologies', *Journal of Retailing and Consumer Services*, vol. 13, no. 3, pp. 177-91.

Lin, C, Shih, HY & Sher, PJ 2007, 'Integrating Technology Readiness into Technology Acceptance: The TRAM Model', *Psychology & Marketing*, vol. 24, no. 7, pp. 641-57.

Lin, H-Y, Hsu, P-Y & Ting, P-H 2006, 'ERP Systems Success: An Integration of IS Success Model and Balanced Scorecard', *Journal of Research and Practice in Information Technology*, vol. 38, no. 3, pp. 215-28.

Lin, J-SC & Hsieh, P-L 2007, 'The Influence of Technology Readiness on Satisfaction and Behavioral Intentions toward Self-Service Technologies', *Computers in Human Behavior*, vol. 23, no. 3, pp. 1597-615.

Lin, JSC & Hsieh, Pl 2006, 'The Role of Technology Readiness in Customers' Perception and Adoption of Self-Service Technologies', *International Journal of Service Industry Management*, vol 17, no 5, pp 497-517.

Lindgren, I & van Veenstra, AF 2018, 'Digital Government Transformation: A Case Illustrating Public E-Service Development as Part of Public Sector Transformation', in *Proceedings of the 19th Annual International Conference on Digital Government Research: Governance in the Data Age*, Delft, Netherlands, pp. 1-6,.

Lindquist, EA & Huse, I 2017, 'Accountability and Monitoring Government in the Digital Era: Promise, Realism and Research for Digital-Era Governance', *Canadian Public Administration*, vol. 60, no. 4, pp. 627-56.

Löfgren, K 2007, 'The Governance of E-Government: A Governance Perspective on the Swedish E-Government Strategy', *Public Policy and Administration*, vol. 22, no. 3, pp. 335-52.

Lofstedt, U 2012, 'E-Government-Assesment of Current Research and Some Proposals for Future Directions', *International Journal of Public Information systems*, vol. 1, no. 1,pp 39-52

Lu, J, Wang, L & Hayes, LA 2012, 'How Do Technology Readiness, Platform Functionality and Trust Influence C2C User Satisfaction', *Journal of Electronic Commerce Research*, vol. 13, no. 1, pp. 50-69.

Lynch, BK 1990, 'Designing Qualitative Research by Catherine Marshall an Gretchen B. Rossman', *Issues in Applied Linguistics*, vol. 1, no. 2.

Lyytinen, K & Damsgaard, J 2001, 'What's Wrong with the Diffusion of Innovation Theory?', in *Working Conference on Diffusing Software Product and Process Innovations*, pp. 173-90.

Lyzara, R, Purwandari, B, Zulfikar, MF, Santoso, HB & Solichah, I 2019, 'E-Government Usability Evaluation: Insights from a Systematic Literature Review', in *Proceedings of the 2nd International Conference on Software Engineering and Information Management*, Bali, Indonesia, pp. 249-53.

Mabinane, L & Edoun, E 2018, 'E-Government Awareness and Usage in South Africa: Some Insights from Residents in Gauteng', in *Proceedings of the 2018 International Conference on Internet and e-Business*, Chengdu, China, pp. 99-103.

Malik, MS & Islam, U 2019, 'Cybercrime: An Emerging Threat to the Banking Sector of Pakistan', *Journal of Financial Crime*, vol 26, no 1, pp 50-60.

Manda, MI & Backhouse, J 2016, 'An Analysis of the Barriers to E-Government Integration, Interoperability and Information Sharing in Developing Countries: A Systematic Review of Literature', in *Proceedings of the African Conference in Information Systems and Technology, Accra, Ghana*, pp. 5-6.

Marcus, AW, Bruce; Goutorbe, Aurélien; 2015, 'Expanding Participation and Boosting Growth: The Infrastructure Needs of the Digital Economy' (Industry report, World Economic Forum, Geneva, Switzerland, March 2015,< https://www3.weforum.org/docs/WEFUSA_DigitalInfrastructure_Report2015.pdf>

Masinde, M & Mkhonto, M 2019, 'The Critical Success Factors for E-Government Implementation in South Africa's Local Government: Factoring in Apartheid Digital Divide', in *2019 IEEE 2nd International Conference on Information and Computer Technologies (ICICT)*, US, pp. 220-8.

Mathieson, K 1991, 'Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior', *Information Systems Research*, vol. 2, no. 3, pp. 173-91.

Mattila, AS & Mount, DJ 2003, 'The Impact of Selected Customer Characteristics and Response Time on E-Complaint Satisfaction and Return Intent', *International Journal of Hospitality Management*, vol. 22, no. 2, pp. 135-45.

McLean, G & Osei-Frimpong, K 2017, 'Examining Satisfaction with the Experience During a Live Chat Service Encounter-Implications for Website Providers', *Computers in Human Behavior*, vol. 76, pp. 494-508.

Melin, U & Wihlborg, E 2018, 'Balanced and Integrated E-Government Implementation– Exploring the Crossroad of Public Policy-Making and Information Systems Project Management Processes', *Transforming Government: People, Process and Policy,* vol 12, no 2, pp 191-208..

Mensah, IK 2019, 'Factors Influencing the Intention of University Students to Adopt and Use E-Government Services: An Empirical Evidence in China', *SAGE Open*, vol. 9, no. 2, pp 1-19.

Mensah, IK, Zeng, G & Luo, C 2020, 'E-Government Services Adoption: An Extension of the Unified Model of Electronic Government Adoption', *SAGE Open*, vol. 10, no. 2, pp I-17.

Meuter, ML, Bitner, MJ, Ostrom, AL & Brown, SW 2005, 'Choosing among Alternative Service Delivery Modes: An Investigation of Customer Trial of Self-Service Technologies', *Journal of Marketing*, vol. 69, no. 2, pp. 61-83.

Meuter, ML, Ostrom, AL, Roundtree, RI & Bitner, MJ 2000, 'Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters', *Journal of Marketing*, vol. 64, no. 3, pp. 50-64.

Michel, S & Cocula, F 2017, 'Impact of the Three IS Qualities on User Satisfaction in an Information-Intensive Sector', *Electronic Journal of Information Systems Evaluation*, vol. 20, no. 2, pp. 85-101.

Minges, M 2015, 'Exploring the Relationship between Broadband and Economic Growth' (Background paper, World Development Report, no 102955), <https://documents1.worldbank.org/curated/en/178701467988875888/pdf/102955-WP-Box394845B-PUBLIC-WDR16-BP-Exploring-the-Relationship-between-Broadband-and-Economic-Growth-Minges.pdf>.

Mishra, D, Akman, I & Mishra, A 2014, 'Theory of Reasoned Action Application for Green Information Technology Acceptance', *Computers in Human Behavior*, vol. 36, pp. 29-40.

Mohammadi, H 2015, 'Investigating Users' Perspectives on E-Learning: An Integration of TAM and IS Success Model', *Computers in Human Behavior*, vol. 45, pp. 359-74.

Molina-Azorin, JF 2016, 'Mixed Methods Research: An Opportunity to Improve Our Studies and Our Research Skills', *European Journal of Management and Business Economics*, vol 25, pp 37-38.

Molnar, A, Janssen, M & Weerakkody, V 2015, 'E-Government Theories and Challenges: Findings from a Plenary Expert Panel', in *Proceedings of the 16th Annual International Conference on Digital Government Research*, Phoenix Arizona, pp. 160-6.

Moon, J-W & Kim, Y-G 2001, 'Extending the Tam for a World-Wide-Web Context', *Information & Management*, vol. 38, no. 4, pp. 217-30.

Moon, MJ 2002, 'The Evolution of E-Government among Municipalities: Rhetoric or Reality?', *Public administration review*, vol. 62, no. 4, pp. 424-33.

—— 2019, 'The on-Nara System for Task and Document Management: Scaling up Back-Office E-Government across the Korean Government' (Article, KDI School of Public Policy and Management, Global Delivery Initiative, Sejong-si, Republic of Korea, March 2019,< https://archives.kdischool.ac.kr/handle/11125/42360>.

Moon, MJ & Norris, DF 2005, 'Does Managerial Orientation Matter? The Adoption of Reinventing Government and E-Government at the Municipal Level', *Information systems journal*, vol. 15, no. 1, pp. 43-60.

Moore, MH 1995, *Creating Public Value: Strategic Management in Government*, Harvard university press.

Mugwagwa, J, Edwards, D & de Haan, S 2015, 'Assessing the Implementation and Influence of Policies That Support Research and Innovation Systems for Health: The Cases of Mozambique, Senegal, and Tanzania', *Health Research Policy and Systems*, vol. 13, no. 1, pp. 1-7.

Naranjo-Zolotov, M, Oliveira, T & Casteleyn, S 2019, 'Citizens' Intention to Use and Recommend E-Participation: Drawing Upon UTAUT and Citizen Empowerment', *Information Technology & People,*vol 32, no 2, pp 364-86.

Nawafleh, S 2018, 'Factors Affecting the Continued Use of E-Government Websites by Citizens: An Exploratory Study in the Jordanian Public Sector', *Transforming Government: People, Process and Policy,* vol 12, no 3/4, pp 224-64.

Nguyen, TD, Nguyen, TM & Cao, TH 2015, 'Information Systems Success: A Literature Review', in *International Conference on Future Data and Security Engineering (FDSE)*, Quy Nhoh, Vietnam, pp. 242-56.

NITB 2019, *E-Office*, MoIT, viewed 19-January-2020 2020, <https://nitb.gov.pk/ProjectDetail/YTZhM2Q5ZDEtNzAzNy00MjJjLWIzNGYtM2ZhM2VkOTFhNDk2>.

Nizamani, U 2019, 'Internet Governance and Pakistan's Digital Economy', *Journal of Current Affairs*.

Norris, DF 2010, 'E-Government 2020: Plus Ça Change, Plus C'est La Meme Chose', *Public Administration Review*, vol. 70, no. S1, p. S180.

Norris, P 2001, *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide*, Cambridge university press.

Nowell, LS, Norris, JM, White, DE & Moules, NJ 2017, 'Thematic Analysis: Striving to Meet the Trustworthiness Criteria', *International Journal of Qualitative Methods*, vol. 16, no. 1, p. 1609406917733847.

O'Reilly, K 2008, *Key Concepts in Ethnography*, Sage.

OECD 2010, *OECD E-Government Studies Efficient E-Government for Smarter Public Service Delivery Denmark 2010*, Denmark, <https://www.oecd.org/gov/digital-government/45382562.pdf>.

—— 2014, 'Recommendation of the Council on Digital Government Strategies', *Paris: OECD. Retrieved June*, vol. 24, p. 2020.

—— 2019, *OECD Skills Outlook 2019: Thriving in a Digital World*, OECD, Paris, France.

—— 2020, *Policy Framework on Sound Public Governance*, <https://www.oecd.org/gov/policy-framework-on-sound-public-governance-c03e01b3-en.htm>.

Ojha, S & Pandey, I 2017, 'Management and Financing of E-Government Projects in India: Does Financing Strategy Add Value?', *IIMB Management Review*, vol. 29, no. 2, pp. 90-108.

Ojo, AI 2017, 'Validation of the Delone and Mclean Information Systems Success Model', *Healthcare Informatics Research*, vol. 23, no. 1, p. 60.

Okunola, OM, Rowley, J & Johnson, F 2017, 'The Multi-Dimensional Digital Divide: Perspectives from an E-Government Portal in Nigeria', *Government Information Quarterly*, vol. 34, no. 2, pp. 329-39.

Oliveira, T & Martins, MF 2011, 'Literature Review of Information Technology Adoption Models at Firm Level', *Electronic Journal of Information Systems Evaluation*, vol. 14, no. 1, p. 110.

Omar, K, Scheepers, H & Stockdale, R 2011, 'Egovernment Service Quality Assessed through the Public Value Lens', in *International Conference on Electronic Government*, pp. 431-40.

Osman, NB 2013, 'Extending the Technology Acceptance Model for Mobile Government Systems', *development*, vol. 5, p. 16.

Otieno, I, Omwenga, E & Waema, T 2016, 'The E-Government Paradox: Is It Real and How Can It Be Resolved?', in *2016 IST-Africa Week Conference*, pp. 1-9.

Pal, D & Arpnikanondt, C 2021, 'An Integrated TAM/ISS Model Based PLS-SEM Approach for Evaluating the Continuous Usage of Voice Enabled IOT Systems', *Wireless Personal Communications*, pp. 1-28.

Panagiotopoulos, P, Klievink, B & Cordella, A 2019, *Public Value Creation in Digital Government*, Elsevier, 0740-624X.

Pandey, V & Gupta, S 2017, 'Understanding G2G E-Government Project Impasse: A Stakeholder Theory Perspective', *Information Development*, vol. 33, no. 4, pp. 361-74.

Pang, M-S, Lee, G & DeLone, WH 2014, 'It Resources, Organizational Capabilities, and Value Creation in Public-Sector Organizations: A Public-Value Management Perspective', *Journal of Information Technology*, vol. 29, no. 3, pp. 187-205.

Parasuraman, A 2000, 'Technology Readiness Index (Tri) a Multiple-Item Scale to Measure Readiness to Embrace New Technologies', *Journal of Service Research*, vol. 2, no. 4, pp. 307-20.

Parasuraman, A & Colby, CL 2015, 'An Updated and Streamlined Technology Readiness Index: TRI 2.0', *Journal of Service Research*, vol. 18, no. 1, pp. 59-74.

Patel, H & Jacobson, D 2008, 'Factors Influencing Citizen Adoption of E-Government: A Review and Critical Assessment', in *ECIS*, pp. 1058-69.

Patton, MQ 1990, *Qualitative Evaluation and Research Methods*, SAGE Publications, Inc.

Pavlou, PA 2003, 'Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model', *International Journal of Electronic Commerce*, vol. 7, no. 3, pp. 101-34.

Pereira, GV, Rinnerbauer, B, Ginner, M & Parycek, P 2017, 'Categorizing Obstacles in E-Government: Formal and Informal', in *Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance*, pp. 157-66.

Pérez-Morote, R, Pontones-Rosa, C & Núñez-Chicharro, M 2020, 'The Effects of E-Government Evaluation, Trust and the Digital Divide in the Levels of E-Government Use in European Countries', *Technological Forecasting and Social Change*, vol. 154, p. 119973.

Peters, RM, Janssen, M & Van Engers, TM 2004, 'Measuring E-Government Impact: Existing Practices and Shortcomings', in *Proceedings of the 6th International Conference on Electronic Commerce*, pp. 480-9.

Petrini, C & Hultman, KE 1995, 'Scaling the Wall of Resistance', *Training & Development*, vol. 49, no. 10, pp. 15-8.

Petter, S, DeLone, W & McLean, E 2008, 'Measuring Information Systems Success: Models, Dimensions, Measures, and Interrelationships', *European Journal of Information Systems*, vol. 17, no. 3, pp. 236-63.

Petter, S, DeLone, W & McLean, ER 2012, 'The Past, Present, and Future of "IS Success"', *Journal of the Association for Information Systems*, vol. 13, no. 5, p. 2.

Petter, S & McLean, ER 2009, 'A Meta-Analytic Assessment of the Delone and Mclean Is Success Model: An Examination of Is Success at the Individual Level', *Information & Management*, vol. 46, no. 3, pp. 159-66.

PEW 2019, *Internet/Broadband Fact Sheet*, viewed 17-March 2021, <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>.

PITB 2021, *Dengue Activity Tracking System*, <https://pitb.gov.pk/dats>.

Pitt, LF, Watson, RT & Kavan, CB 1995, 'Service Quality: A Measure of Information Systems Effectiveness', *MIS Quarterly*, pp. 173-87.

Porter, ME & Kramer, MR 2019, 'Creating Shared Value', in *Managing Sustainable Business*, Springer, pp. 323-46.

Prediger, S, Bikner-Ahsbahs, A & Arzarello, F 2008, 'Networking Strategies and Methods for Connecting Theoretical Approaches: First Steps Towards a Conceptual Framework', *Zdm*, vol. 40, no. 2, pp. 165-78.

PT Authority 2018, *Annual Report 2018*, by PTA, PTA, <https://pta.gov.pk/assets/media/pta_ann_rep_2018_121218.pdf>.

—— 2021, *Telecom Indicators*, viewed 20-Sep-21 2021, <https://www.pta.gov.pk/index.php/en/telecom-indicators>.

Qaisar, N & Khan, HGA 2010, 'E-Government Challenges in Public Sector: A Case Study of Pakistan', *International Journal of Computer Science Issues (IJCSI)*, vol. 7, no. 5, p. 310.

Qureshi, QA, Shah, B, Ullah, N, Kundi, GM, Nawaz, A, Miankhel, AK, Chishti, KA & Qureshi, NA 2013, 'The Impact of Top Management Support and E-Health Policies on the Success of E-Health Practices in Developing Countries', *Scholarly Journal of Medicine*, vol. 3, no. 3, pp. 27-30.

Radhakrishna, R 2008, 'Tips for Writing Introduction (Chapter One) of Thesis/Dissertation Using the Cone Analogy', *NACTA Journal*, pp. 48-50.

Raguseo, E & Ferro, E 2011, 'Egovernment and Organizational Changes: Towards an Extended Governance Model', in *International Conference on Electronic Government*, pp. 418-30.

Rai, A, Lang, SS & Welker, RB 2002, 'Assessing the Validity of IS Success Models: An Empirical Test and Theoretical Analysis', *Information Systems Research*, vol. 13, no. 1, pp. 50-69.

Rana, NP, Dwivedi, YK, Lal, B, Williams, MD & Clement, M 2017, 'Citizens' Adoption of an Electronic Government System: Towards a Unified View', *Information Systems Frontiers*, vol. 19, no. 3, pp. 549-68.

Rana, NP, Dwivedi, YK & Williams, MD 2013, 'Evaluating Alternative Theoretical Models for Examining Citizen Centric Adoption of E-Government', *Transforming Government: People, Process and Policy,*vol 7, no 1, pp 27-49.

Rana, NP, Dwivedi, YK, Williams, MD & Lal, B 2015, 'Examining the Success of the Online Public Grievance Redressal Systems: An Extension of the IS Success Model', *Information Systems Management*, vol. 32, no. 1, pp. 39-59.

Rana, NP, Dwivedi, YK, Williams, MD & Weerakkody, V 2015, 'Investigating Success of an E-Government Initiative: Validation of an Integrated IS Success Model', *Information Systems Frontiers*, vol. 17, no. 1, pp. 127-42.

Rao, VR 2011a, 'Collaborative Government to Employee (G2E) Issues and Challenges to E-Government', *Journal of e-Governance*, vol. 34, no. 4, pp. 214-29.

—— 2011b, 'Collaborative Government to Employee (G2E): Issues and Challenges to E-Government', *Journal of e-Governance*, vol. 34, no. 4, pp. 214-29.

Reddick, CG 2005, 'Citizen Interaction with E-Government: From the Streets to Servers?', *Government Information Quarterly*, vol. 22, no. 1, pp. 38-57.

Reddick, CG, Enriquez, R, Harris, RJ & Sharma, B 2020, 'Determinants of Broadband Access and Affordability: An Analysis of a Community Survey on the Digital Divide', *Cities*, vol. 106, p. 102904.

Rehman, M, Kamal, MM & Esichaikul, V 2016, 'Adoption of E-Government Services in Pakistan: A Comparative Study between Online and Offline Users', *Information Systems Management*, vol. 33, no. 3, pp. 248-67.

Reja, U, Manfreda, KL, Hlebec, V & Vehovar, V 2003, 'Open-Ended Vs. Close-Ended Questions in Web Questionnaires', *Developments in Applied Statistics*, vol. 19, no. 1, pp. 159-77.

Ren, M 2019, 'Why Technology Adoption Succeeds or Fails: An Exploration from the Perspective of Intra-Organizational Legitimacy', *The Journal of Chinese Sociology*, vol. 6, no. 1, pp. 1-26.

Reybold, LE, Lammert, JD & Stribling, SM 2013, 'Participant Selection as a Conscious Research Method: Thinking Forward and the Deliberation of 'Emergent'findings', *Qualitative Research*, vol. 13, no. 6, pp. 699-716.

Ridgway, VF 1956, 'Dysfunctional Consequences of Performance Measurements', *Administrative Science Quarterly*, vol. 1, no. 2, pp. 240-7.

Ringle, CM, Sarstedt, M & Straub, DW 2012, 'Editor's Comments: A Critical Look at the Use of PLS-SEM in" MIS Quarterly"', *MIS Quarterly*, pp. iii-xiv.

Robson, C & McCartan, K 2016, *Real World Research*, John Wiley & Sons.

Rodríguez-Bolívar, MP 2014, 'Measuring E-Government Efficiency', *Public Administration and Information Technology*, 5 edn. Springer, pp v-vii.

Rodriguez-Hevía, LF, Navío-Marco, J & Ruiz-Gómez, LM 2020, 'Citizens' Involvement in E-Government in the European Union: The Rising Importance of the Digital Skills', *Sustainability*, vol. 12, no. 17, p. 6807.

Rogers, EM 2010, *Diffusion of Innovations*, Simon and Schuster.

Rojas-Méndez, JI, Parasuraman, A & Papadopoulos, N 2017, 'Demographics, Attitudes, and Technology Readiness: A Cross-Cultural Analysis and Model Validation', *Marketing Intelligence & Planning*, vol 35, no 1, pp 18-39.

Roldán, JL & Sánchez-Franco, MJ 2012, 'Variance-Based Structural Equation Modeling: Guidelines for Using Partial Least Squares in Information Systems Research', in *Research Methodologies, Innovations and Philosophies in Software Systems Engineering and Information Systems*, IGI Global, pp. 193-221.

Rose, J, Persson, JS & Heeager, LT 2015, 'How E-Government Managers Prioritise Rival Value Positions: The Efficiency Imperative', *Information Polity*, vol. 20, no. 1, pp. 35-59.

Rose, J, Persson, JS, Heeager, LT & Irani, Z 2015, 'Managing E-Government: Value Positions and Relationships', *Information Systems Journal*, vol. 25, no. 5, pp. 531-71.

Ryan, F, Coughlan, M & Cronin, P 2009, 'Interviewing in Qualitative Research: The One-to-One Interview', *International Journal of Therapy and Rehabilitation*, vol. 16, no. 6, pp. 309-14.

Sabherwal, R, Jeyaraj, A & Chowa, C 2006, 'Information System Success: Individual and Organizational Determinants', *Management Science*, vol. 52, no. 12, pp. 1849-64.

Saeed, KA, Hwang, Y & Mun, YY 2003, 'Toward an Integrative Framework for Online Consumer Behavior Research: A Meta-Analysis Approach', *Journal of Organizational and End User Computing (JOEUC)*, vol. 15, no. 4, pp. 1-26.

Saldaña, J 2021, *The Coding Manual for Qualitative Researchers*, 3 edn, SAGE Publications Ltd, US.

Salkind, NJ 2010, *Encyclopedia of Research Design*, vol. 1, Sage.

Sambasivan, M, Wemyss, GP & Rose, RC 2010, 'User Acceptance of a G2B System: A Case of Electronic Procurement System in Malaysia', *Internet Research*, vol 20, no 2, pp 169-87.

Santa, R, MacDonald, JB & Ferrer, M 2019, 'The Role of Trust in E-Government Effectiveness, Operational Effectiveness and User Satisfaction: Lessons from Saudi Arabia in E-G2B', *Government Information Quarterly*, vol. 36, no. 1, pp. 39-50.

Sarstedt, M, Hair, JF, Ringle, CM, Thiele, KO & Gudergan, SP 2016, 'Estimation Issues with PLS and CBSEM: Where the Bias Lies!', *Journal of Business Research*, vol. 69, no. 10, pp. 3998-4010.

Sarstedt, M, Hair Jr, JF, Cheah, J-H, Becker, J-M & Ringle, CM 2019, 'How to Specify, Estimate, and Validate Higher-Order Constructs in PLS-SEM', *Australasian Marketing Journal (AMJ)*, vol. 27, no. 3, pp. 197-211.

Saunders, M, Lewis, P & Thornhill, A 2009, *Research Methods for Business Students*, Pearson education.

Savoldelli, A, Codagnone, C & Misuraca, G 2012, 'Explaining the Egovernment Paradox: An Analysis of Two Decades of Evidence from Scientific Literature and Practice on Barriers to Egovernment', in *Proceedings of the 6th International Conference on Theory and Practice of Electronic Governance*, ACM, Albany, US, pp. 287-96.

—— 2014, 'Understanding the E-Government Paradox: Learning from Literature and Practice on Barriers to Adoption', *Government Information Quarterly*, vol. 31, pp. S63-S71.

Savoldelli, A, Misuraca, G & Codagnone, C 2013, 'Measuring the Public Value of E-Government: The EGEP2. 0 Model', *Electronic Journal of E-government*, vol. 11, no. 1, pp. 373-88.

Saxena, K & Chauhan, K 2013, 'E-Governance for Rural Poor: Issues & Challenges', *FIIB Business Review*, vol. 2, no. 4, pp. 9-15.

Saxena, S 2017, 'Factors Influencing Perceptions on Corruption in Public Service Delivery Via E-Government Platform', *Foresight,* vol 19, no 6, pp 628-46.

Schepers, J & Wetzels, M 2007, 'A Meta-Analysis of the Technology Acceptance Model: Investigating Subjective Norm and Moderation Effects', *Information & Management*, vol. 44, no. 1, pp. 90-103.

Schlägel, C & Sarstedt, M 2016, 'Assessing the Measurement Invariance of the Four-Dimensional Cultural Intelligence Scale across Countries: A Composite Model Approach', *European Management Journal*, vol. 34, no. 6, pp. 633-49.

Schmidthuber, L, Piller, F, Bogers, M & Hilgers, D 2019, 'Citizen Participation in Public Administration: Investigating Open Government for Social Innovation', *R&D Management*, vol. 49, no. 3, pp. 343-55.

Scholl, HJ 2014, 'The EGov Research Community: An Update on Where We Stand', in *International Conference on Electronic Government*, Dublin, Ireland, pp. 1-16.

Scholl, HJJ 2008, 'Discipline or Interdisciplinary Study Domain? Challenges and Promises in Electronic Government Research', in *Digital Government*, Springer, pp. 21-41.

Schoonenboom, J & Johnson, RB 2017, 'How to Construct a Mixed Methods Research Design', *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie*, vol. 69, no. 2, pp. 107-31.

Scott, I & Gong, T 2021, 'Coordinating Government Silos: Challenges and Opportunities', *Global Public Policy and Governance*, vol. 1, no. 1, pp. 20-38.

Scott, M, DeLone, W & Golden, W 2016, 'Measuring eGovernment Success: A Public Value Approach', *European Journal of Information Systems*, vol. 25, no. 3, pp. 187-208.

Sebetci, Ö 2015, 'A TAM-Based Model for E-Government: A Case for Turkey', *International Journal of Electronic Governance*, vol. 7, no. 2, pp. 113-35.

Senturia, T, Flees, L & Maceda, M 2008, 'Leading Change Management Requires Sticking to the Plot', *London: Bain & Company*.

Sepasgozar, FME, Ramzani, U, Ebrahimzadeh, S, Sargolzae, S & Sepasgozar, S 2020, 'Technology Acceptance in E-Governance: A Case of a Finance Organization', *Journal of Risk and Financial Management*, vol. 13, no. 7, p. 138.

Serrano, N, Gallardo, G & Hernantes, J 2015, 'Infrastructure as a Service and Cloud Technologies', *IEEE Software*, vol. 32, no. 2, pp. 30-6.

Shad, MR 2019, 'Cyber Threat Landscape and Readiness Challenge of Pakistan', *Strategic Studies*, vol. 39, no. 1, pp. 1-19.

Shafique, MA, Malik, BH, Mahmood, Y, Cheema, SN, Hameed, K & Tabassum, S 2017, 'Determinants Impacting the Adoption of E-Government Information Systems and Suggesting Cloud Computing Migration Framework', *International Journal Of Advanced Computer Science and Applications*, vol. 8, no. 9, pp. 173-82.

Shah Alam, S 2009, 'Adoption of Internet in Malaysian SMEs', *Journal of Small Business and Enterprise Development*, vol. 16, no. 2, pp. 240-55.

Shareef, MA, Kumar, V, Kumar, U & Dwivedi, YK 2011, 'E-Government Adoption Model (GAM): Differing Service Maturity Levels', *Government Information Quarterly*, vol. 28, no. 1, pp. 17-35.

Shrestha, N 2020, 'Detecting Multicollinearity in Regression Analysis', *American Journal of Applied Mathematics and Statistics*, vol. 8, no. 2, pp. 39-42.

Siau, K & Long, Y 2005, 'Synthesizing E-Government Stage Models–a Meta-Synthesis Based on Meta-Ethnography Approach', *Industrial Management & Data Systems*.

Siddiquee, NA 2016, 'E-Government and Transformation of Service Delivery in Developing Countries: The Bangladesh Experience and Lessons', *Transforming Government: People, Process and Policy*, vol. 10, no. 3, pp. 368-90.

Singh, M, Sarkar, P, Dissanayake, D & Pittachayawa, S 2008, 'Diffusion of E-Government Services in Australia: Citizens' Perspectives', *European Conference on Information Systems*, Galway, Ireland.

Singh, S 2017, 'Bridging the Gender Digital Divide in Developing Countries', *Journal of Children and Media*, vol. 11, no. 2, pp. 245-7.

Singla, A & Bertino, E 2018, 'Blockchain-Based PKI Solutions for IOT', in *2018 IEEE 4th International Conference on Collaboration and Internet Computing (CIC)*, Philadelphia, US, pp. 9-15.

Šiška, L 2018, 'The First and the Second Generation of Statistical Methods in Management Accounting Research', in *The Impact of Globalization on International Finance and Accounting*, Springer, pp. 441-8.

Smith, J & Firth, J 2011, 'Qualitative Data Analysis: The Framework Approach', *Nurse Researcher*, vol. 18, no. 2, pp. 52-62.

Smuts, RG, Lalitha, VM & Khan, HU 2017, 'Change Management Guidelines That Address Barriers to Technology Adoption in an Hei Context', in *2017 IEEE 7th International Advance Computing Conference (IACC)*, Hyderabad, India, pp. 754-8.

Soper, DS 2020, *A-Priori Sample Size Calculator for Structural Equation Models [Software]*, <https://www.danielsoper.com/statcalc/calculator.aspx?id=89>.

Sorongan, E & Hidayati, Q 2020, 'Evaluation of Implementation E-Government with Delone and Mclean', *INTENSIF: Jurnal Ilmiah Penelitian dan Penerapan Teknologi Sistem Informasi*, vol. 4, no. 1, pp. 22-37.

Srivastava, SC & Teo, TS 2009, 'Citizen Trust Development for E-Government Adoption and Usage: Insights from Young Adults in Singapore', *Communications of the Association for Information Systems*, vol. 25, no. 1, p. 31.

Stagl, H 2017, *Resistance Vs. Readiness: Equal, Opposite, or Integral?*, viewed 27-March-2019 2019, <https://www.enclaria.com/2017/04/26/resistance-vs-readiness-equal-opposite-or-integral/>.

Sterrenberg, G 2016, 'Measuring IS Success of E-Government: A Case Study on the Disability Sector in Australia', *Australasian Conference on Information Systems (ACIS)*.

Stoker, G 2006, 'Public Value Management: A New Narrative for Networked Governance?', *The American Review of Public Administration*, vol. 36, no. 1, pp. 41-57.

Straub, D, Boudreau, M-C & Gefen, D 2004, 'Validation Guidelines for IS Positivist Research', *Communications of the Association for Information Systems*, vol. 13, no. 1, p. 24.

Straub, ET 2009, 'Understanding Technology Adoption: Theory and Future Directions for Informal Learning', *Review of Educational Research*, vol. 79, no. 2, pp. 625-49.

Sukamolson, S 2007, 'Fundamentals of Quantitative Research', *Language Institute Chulalongkorn University*, vol. 1, pp. 2-3.

Suri, P 2017, 'Measuring E-Governance Performance', in *Strategic Planning and Implementation of E-Governance*, Springer, pp. 25-39.

Susanto, TD & Aljoza, M 2015, 'Individual Acceptance of E-Government Services in a Developing Country: Dimensions of Perceived Usefulness and Perceived Ease of Use and the Importance of Trust and Social Influence', *Procedia Computer Science*, vol. 72, pp. 622-9.

Syed, R, Khaver, AA & Yasin, M 2019, 'Cyber Security: Where Does Pakistan Stand?' (Working paper, no 167), Sustainable Development Policy Institite, Islamabad, Pakistan .

Tabachnick, BG, Fidell, LS & Ullman, JB 2007, *Using Multivariate Statistics*, vol. 5, Pearson Boston, MA.

Taherdoost, H 2018, 'A Review of Technology Acceptance and Adoption Models and Theories', *Procedia Manufacturing*, vol. 22, pp. 960-7.

Tang, H, Zhang, P, Song, S & Yan, H 2011, 'Using Association Rules Mining to Provide Personalized Information in E-Government', in *2011 International Conference on E-Business and E-Government (ICEE)*, Shanghai, China, pp. 1-4.

Tao, D 2009, 'Intention to Use and Actual Use of Electronic Information Resources: Further Exploring Technology Acceptance Model (TAM)', in *AMIA Annual Symposium Proceedings*, vol. 2009, San Francisco, US, p. 629.

Taylor, D, Bury, M, Campling, N, Carter, S, Garfied, S, Newbould, J & Rennie, T 2006, 'A Review of the Use of the Health Belief Model (HBM), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and the Trans-Theoretical Model (TTM) to Study and Predict Health Related Behaviour Change', (Consultation paper), NHS National Institute for Health and Clinical Excellence, London, UK.

Teddlie, C & Tashakkori, A 2009, *Foundations of Mixed Methods Research*, SAGE Publications, Inc., United States of America.

Telecom Re-Organization Act, 1996, Pakistan.

Teo, TS, Srivastava, SC & Jiang, L 2008, 'Trust and Electronic Government Success: An Empirical Study', *Journal of Management Information Systems*, vol. 25, no. 3, pp. 99-132.

Terry, G, Hayfield, N, Clarke, V & Braun, V 2017, 'Thematic Analysis', *The SAGE Handbook of Qualitative Research in Psychology*, vol. 2, pp. 17-37.

Timans, R, Wouters, P & Heilbron, J 2019, 'Mixed Methods Research: What It Is and What It Could Be', *Theory and Society*, vol. 48, no. 2, pp. 193-216.

Tobi, H & Kampen, JK 2018, 'Research Design: The Methodology for Interdisciplinary Research Framework', *Quality & Quantity*, vol. 52, no. 3, pp. 1209-25.

Tohidi, H 2011, 'E-Government and Its Different Dimensions: Iran', *Procedia Computer Science*, vol. 3, pp. 1101-5.

Toves, PR, Graf, L & Gould, DA 2016, 'Innovative Use of Force Field Analysis: Factors Influencing Technology-Enabled Change', *Journal of Behavioral and Applied Management*, vol. 17, no. 2, p. 1183.

Twizeyimana, JD & Andersson, A 2019a, 'The Public Value of E-Government–a Literature Review', *Government Information Quarterly*, vol. 36, no. 2, pp. 167-78.

—— 2019b, 'The Public Value of E-Government–a Literature Review', *Government Information Quarterly,* vol. 36, no. 2, pp. 167-78.

UN 2016, 'UN E-Governmnet Survey 2016', < https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2016-Survey/E-Government%20Survey%202016.pdf>.

—— 2018a, *Unleashing the Potential of a Young Pakistan*, <http://hdr.undp.org/en/content/unleashing-potential-young-pakistan>.

—— 2018b, 'World Economic and Social Survey 2018', <https://www.un.org/development/desa/publications/world-economic-and-social-survey-2018.html>.

—— 2020a, *E-Government*, viewed 23-04-21 2021, <https://publicadministration.un.org/egovkb/en-us/about/unegovdd-framework>.

—— 2020b, 'E-Government Survey 2020',< https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/2020%20UN%20E-Government %20Survey %20(Full%20Report).pdf>.

—— 2020c, 'UN E-Government Knowledgebase', <https://publicadministration.un.org/egovkb>.

UN Economic and Social Commission for Asia and the Pacific 2016, *E-Government for Women's Empowerment in Asia and the Pacific,*< https://www.unescap.org/sites/default/files/E-Government-for-Women-in-Asia-Pacific.pdf>.

UNDP 2008, *Gender Responsive E-Governance: Exploring the Transformative Potential,* <https://www.undp.org/publications/gender-responsive-e-governance-exploring-transformative-potential>.

UNICEF 2021, *Education*, viewed 11-11-21 2021, <https://www.unicef.org/pakistan/education>.

United Nations 2014, *UN E-Government Survey,*< https://publicadministration.un.org/egovkb/portals/egovkb/documents/un/2014-survey/e-gov_complete_survey-2014.pdf>.

—— 2018, *United Nations E-Government Survey 2018*, <https://publicadministration.un.org/egovkb/portals/egovkb/documents/un/2018-survey/e-government %20survey %20 2018_final%20for%20web.pdf>.

Urbach, N, Smolnik, S & Riempp, G 2008, 'A Methodological Examination of Empirical Research on Information Systems Success: 2003 to 2007', *AMCIS 2008 proceedings*, p. 7.

—— 2010, 'An Empirical Investigation of Employee Portal Success', *The Journal of Strategic Information Systems*, vol. 19, no. 3, pp. 184-206.

US E-Government Act,, 2002, United States, <https://www.govinfo.gov/content/pkg/PLAW-107publ347/pdf/PLAW-107publ347.pdf>.

Van Rossem, S, Sayadi, B, Roullet, L, Mimidis, A, Paolino, M, Veitch, P, Berde, B, Labrador, I, Ramos, A & Tavernier, W 2018, 'A Vision for the Next Generation Platform-as-a-Service', in *2018 IEEE 5G World Forum (5GWF)*, pp. 14-9.

Vasiu, I & Vasiu, L 2006, 'Top Management Skills in E-Governance: A Conceptual Framework', *Journal of E-Government*, vol. 2, no. 3, pp. 5-17.

Vatcheva, KP, Lee, M, McCormick, JB & Rahbar, MH 2016, 'Multicollinearity in Regression Analyses Conducted in Epidemiologic Studies', *Epidemiology (Sunnyvale, Calif.)*, vol. 6, no. 2.

Veeramootoo, N, Nunkoo, R & Dwivedi, YK 2018, 'What Determines Success of an E-Government Service? Validation of an Integrative Model of E-Filing Continuance Usage', *Government Information Quarterly*, vol. 35, no. 2, pp. 161-74.

Venkatesh, V 2006, 'Where to Go from Here? Thoughts on Future Directions for Research on Individual-Level Technology Adoption with a Focus on Decision Making', *Decision Sciences*, vol. 37, no. 4, pp. 497-518.

Venkatesh, V, Brown, SA & Bala, H 2013, 'Bridging the Qualitative-Quantitative Divide: Guidelines for Conducting Mixed Methods Research in Information Systems', *MIS Quarterly*, pp. 21-54.

Venkatesh, V & Davis, FD 2000, 'A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies', *Management Science*, vol. 46, no. 2, pp. 186-204.

Venkatesh, V, Morris, MG, Davis, GB & Davis, FD 2003, 'User Acceptance of Information Technology: Toward a Unified View', *MIS quarterly*, pp. 425-78.

Venkatesh, V, Thong, JY, Chan, FK & Hu, PJ 2016, 'Managing Citizens' Uncertainty in E-Government Services: The Mediating and Moderating Roles of Transparency and Trust', *Information Systems Research*, vol. 27, no. 1, pp. 87-111.

Venkatesh, V, Thong, JY & Xu, X 2016, 'Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead', *Journal of the Association for Information Systems*, vol. 17, no. 5, pp. 328-76.

Voutinioti, A 2013, 'Determinants of User Adoption of E-Government Services in Greece and the Role of Citizen Service Centres', *Procedia Technology*, vol. 8, pp. 238-44.

Walczuch, R, Lemmink, J & Streukens, S 2007, 'The Effect of Service Employees' Technology Readiness on Technology Acceptance', *Information & Management*, vol. 44, no. 2, pp. 206-15.

Wang, Y-S & Liao, Y-W 2008, 'Assessing Egovernment Systems Success: A Validation of the Delone and Mclean Model of Information Systems Success', *Government Information Quarterly*, vol. 25, no. 4, pp. 717-33.

Wang, Y-Y, Wang, Y-S, Lin, H-H & Tsai, T-H 2019, 'Developing and Validating a Model for Assessing Paid Mobile Learning App Success', *Interactive Learning Environments*, vol. 27, no. 4, pp. 458-77.

Wang, Y, So, KKF & Sparks, BA 2017, 'Technology Readiness and Customer Satisfaction with Travel Technologies: A Cross-Country Investigation', *Journal of Travel Research*, vol. 56, no. 5, pp. 563-77.

Wang, YS 2008, 'Assessing E-Commerce Systems Success: A Respecification and Validation of the Delone and Mclean Model of IS Success', *Information Systems Journal*, vol. 18, no. 5, pp. 529-57.

Warkentin, M, Gefen, D, Pavlou, PA & Rose, GM 2002, 'Encouraging Citizen Adoption of E-Government by Building Trust', *Electronic Markets*, vol. 12, no. 3, pp. 157-62.

Watson, RT & Mundy, B 2001, 'A Strategic Perspective of Electronic Democracy', *Communications of the ACM*, vol. 44, no. 1, pp. 27-.

Weerakkody, V, Irani, Z, Lee, H, Hindi, N & Osman, I 2016, 'Are UK Citizens Satisfied with E-Government Services? Identifying and Testing Antecedents of Satisfaction', *Information Systems Management*, vol. 33, no. 4, pp. 331-43.

Weiss, JW, Gulati, GJ, Yates, DJ & Yates, LE 2015, 'Mobile Broadband Affordability and the Global Digital Divide--An Information Ethics Perspective', in *2015 48th Hawaii International Conference on System Sciences*, pp. 2177-86.

Wescott, CG 2001, 'E-Government in the Asia-Pacific Region', *Asian Journal of Political Science*, vol. 9, no. 2, pp. 1-24.

Westjohn, SA, Arnold, MJ, Magnusson, P, Zdravkovic, S & Zhou, JX 2009, 'Technology Readiness and Usage: A Global-Identity Perspective', *Journal of the Academy of Marketing Science*, vol. 37, no. 3, pp. 250-65.

Westland, JC 2010, 'Lower Bounds on Sample Size in Structural Equation Modeling', *Electronic Commerce Research and Applications*, vol. 9, no. 6, pp. 476-87.

Williams, I & Shearer, H 2011, 'Appraising Public Value: Past, Present and Futures', *Public Administration*, vol. 89, no. 4, pp. 1367-84.

Wirtz, BW & Daiser, P 2018, 'A Meta-Analysis of Empirical E-Government Research and Its Future Research Implications', *International Review of Administrative Sciences*, vol. 84, no. 1, pp. 144-63.

Wolf, EJ, Harrington, KM, Clark, SL & Miller, MW 2013, 'Sample Size Requirements for Structural Equation Models: An Evaluation of Power, Bias, and Solution Propriety', *Educational and Psychological Measurement*, vol. 73, no. 6, pp. 913-34.

Wong, MS, Hideki, N & George, P 2011, 'The Use of Importance-Performance Analysis (IPA) in Evaluating Japan's E-Government Services', *Journal of Theoretical and Applied Electronic Commerce Research*, vol. 6, no. 2, pp. 17-30.

World Bank *Rural Population (% of Total Population) - Pakistan*, viewed 05-Aug-21 2021, <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=PK>.

—— 2002, 'New-Economy Sector Study Electronic Government and Governance: Lessons for Argentina', *New-economy sector study: Electronic government and governance-lessons from Argentina Retrieved from http://documents. worldbank. org/curated/en/527061468769894044/pdf/266390WP0E1Gov1gentina1Final1Report. pdf.*

—— 2016, *World Development Report 2016: Digital Dividends*, The World Bank, 1464806713.

—— 2021a, *Digital Governance Projects Database*, viewed 15-4-2021, <https://datacatalog.worldbank.org/dataset/digital-governance-projects-database>.

—— 2021b, *Government Expenditure on Education, Total (% of Gdp) - Pakistan*, <https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?locations=PK>.

—— 2021c, *Literacy Rate, Adult Total (% of People Ages 15 and above) - Pakistan*, <https://data.worldbank.org/indicator/SE.ADT.LITR.ZS?locations=PK>.

Wright, KB 2005, 'Researching Internet-Based Populations: Advantages and Disadvantages of Online Survey Research, Online Questionnaire Authoring Software Packages, and Web Survey Services', *Journal of Computer-Mediated Communication*, vol. 10, no. 3, p. JCMC1034.

Xie, Q, Song, W, Peng, X & Shabbir, M 2017, 'Predictors for E-Government Adoption: Integrating TAM, TPB, Trust and Perceived Risk', *The Electronic Library,* vol 35, no 1, pp 2-20.

Xinli, H 2015, 'Effectiveness of Information Technology in Reducing Corruption in China', *The Electronic Library,* vol 33, no 1, pp 52-64.

Yang, T-M & Wu, Y-J 2015, 'Exploring the Effectiveness of Cross-Boundary Information Sharing in the Public Sector: The Perspective of Government Agencies', *Information Research,* vol 20, no 3, pp 1-13.

Yang, Y, Liu, Q, Song, J & Zhou, M 2021, 'The Influence Mechanism of Financial Shared Service Mode on the Competitive Advantage of Enterprises from the Perspective of Organizational Complexity: A Force Field Analysis', *International Journal of Accounting Information Systems*, vol. 42, p. 100525.

Yen, C & Chang, C-M 2015, 'Unity Is Strength: Understanding Users' group Buying Behavior in Taiwan from a Collectivism Perspective', *Journal of Electronic Commerce Research*, vol. 16, no. 2, p. 109.

Yen, HR 2005, 'An Attribute-Based Model of Quality Satisfaction for Internet Self-Service Technology', *The Service Industries Journal*, vol. 25, no. 5, pp. 641-59.

Yera, A, Arbelaitz, O, Jauregui, O & Muguerza, J 2020, 'Characterization of E-Government Adoption in Europe', *PloS One*, vol. 15, no. 4, p. e0231585.

Yildiz, M 2007, 'E-Government Research: Reviewing the Literature, Limitations, and Ways Forward', *Government Information Quarterly*, vol. 24, no. 3, pp. 646-65.

Young, R & Jordan, E 2008, 'Top Management Support: Mantra or Necessity?', *International Journal of Project Management*, vol. 26, no. 7, pp. 713-25.

Yousafzai, SY, Foxall, GR & Pallister, JG 2007, 'Technology Acceptance: A Meta-Analysis of the TAM: Part 1', *Journal of Modelling in Management,* vol 2, no 3, pp 251-80.

Yusuf, M, Adams, C & Dingley, K 2014, 'Research Philosophy and Methodologies of E-Government: Update from Eceg and ICEG', in *Conference Proceedings, The 14th European Conference on E-Government (ECEG), Spiru Haret University, Romania*, pp. 242-51.

Zahid, H & Haji Din, B 2019, 'Determinants of Intention to Adopt E-Government Services in Pakistan: An Imperative for Sustainable Development', *Resources*, vol. 8, no. 3, p. 128.

Zahran, DI, Al-Nuaim, HA, Rutter, MJ & Benyon, D 2015, 'A Critical Analysis of E-Government Evaluation Models at National and Local Municipal Levels', *Electronic Journal of E-government*, vol. 13, no. 1, pp. pp28-42-pp28-42.

Zauner, A, Koller, M & Hatak, I 2015, 'Customer Perceived Value—Conceptualization and Avenues for Future Research', *Cogent Psychology*, vol. 2, no. 1, p. 1061782.

Zeithaml, VA, Parasuraman, A & Malhotra, A 2002, 'Service Quality Delivery through Web Sites: A Critical Review of Extant Knowledge', *Journal of the Academy of Marketing Science*, vol. 30, no. 4, pp. 362-75.

Zhang, J, Puron-Cid, G & Gil-Garcia, JR 2015, 'Creating Public Value through Open Government: Perspectives, Experiences and Applications', *Information Polity*, vol. 20, no. 2, 3, pp. 97-101.

Zhao, F & Khan, MS 2013, 'An Empirical Study of E-Government Service Adoption: Culture and Behavioral Intention', *International Journal of Public Administration*, vol. 36, no. 10, pp. 710-22.

Zhou, T, Lu, Y & Wang, B 2010, 'Integrating TTF and UTAUT to Explain Mobile Banking User Adoption', *Computers in Human Behavior*, vol. 26, no. 4, pp. 760-7.

Ziemba, E, Papaj, T, Żelazny, R & Jadamus-Hacura, M 2016, 'Factors Influencing the Success of E-Government', *Journal of Computer Information Systems*, vol. 56, no. 2, pp. 156-67.

Züll, C 2016, 'Open-Ended Questions', *GESIS Survey Guidelines*, Mannheim, Germany: GESIS – Leibniz Institute for the Social Sciences.

Introduction

We invite you to be part of a study that examines digital transformation in public sector organisations in Pakistan. The aim of the study is to investigate the critical success factors for adoption of electronic government services among citizens and to evaluate their impact in Pakistan. This project is being conducted by Shahid Nishat, a student researcher at Victoria University Melbourne as part of his doctoral studies.

Using information technology to provide government services to the citizens or businesses is commonly referred as e-Government. These services can be accessed via a fixed device (like computer) or a mobile device (like smart phone). Browsing government's websites to get information, doing online transactions or interacting with government organisations using mobile applications are some examples of e-Government services. For this study, we are interested in your experience of e-Government services accessed via your mobile devices.

The questionnaire may take around 15 minutes to complete. All information provided by the participants will be treated with strict confidentiality. Your participation in survey is voluntary and any queries about your participation in this project may be directed to the researcher at email: Shahid.nishat@live.vu.edu.au. Thank you for taking the time to participate in this study.

PART A: DEMOGRAPHIC AND BACKGROUND INFORMATION.

1. Gender.
   ☐ Male ☐ Female

2. Age.
   ☐ 18-24 ☐ 25-39 years ☐ 40-59 years ☐ 60 years and above years

3. Highest educational qualification attained.
   ☐ Primary ☐ Secondary ☐ Bachelors ☐ Master ☐ Doctorate

Take this ladder as representing where people stand in Pakistan. At the top of the ladder are the people who are most prosperous– those who are the richest, having the highest education

and the most respected jobs. At the bottom are the people who are the poorest – having least money, lowest level of education, and menial jobs or no job. Where would you place **YOURSELF** on this ladder? Please choose the place on the ladder where you think you stand at this time in your life, relative to other people in Pakistan [10 = Top, 1 = Bottom]

Please indicate when you last used an electronic Government service.	**Regular user**	**In the last 3 months**	**More than 6+ months ago**	**Never Used**
Select the one that is most applicable	○	○	○	○

Please indicate which e-Government services or applications you have recently used.

- ☐ Pakistan Citizen Portal
- ☐ COVID-19 Gov PK
- ☐ FBR's Tax Asaan
- ☐ Used e-Government services through web portals
- ☐ Any other (please indicate) _____
- ☐ Never Used

PART B: ADOPTION AND SUCCESS VARIABLES.

Please relate your experience of using e-Government services accessed via your mobile device and indicate (by ticking) your level of agreement with each of the following statements.

	Strongly Disagree	**Disagree**	**Neutral /Neither agree nor disagree**	**Agree**	**Strongly Agree**
E-Government Information Quality.					
1-The e-Government services provide me accurate information.	○	○	○	○	○
2- The e-Government services provide me up-to-date information.	○	○	○	○	○
3- The e-Government services provide information in a useful format.	○	○	○	○	○
4-I can get sufficient information using e-Government services.	○	○	○	○	○
5- The information provided by e-Government services meet my needs.	○	○	○	○	○
6- The information provided by e-Government services is reliable.	○	○	○	○	○

E-Government System Quality.					
7-The e-Government system is easy to use.	○	○	○	○	○
8-The e-Government system is user friendly.	○	○	○	○	○
9-The e-Government system provides the desired results.	○	○	○	○	○
E-Government Service Quality.					
10- If I face any problem while using an e-Government service, support staff is able to help and resolve it.	○	○	○	○	○
11-I think it's safe to provide personal data to government agencies through electronic means.	○	○	○	○	○
12-The e-Government services give me prompt individual response.	○	○	○	○	○
13-The e-Government services are designed in a way to satisfy my needs.	○	○	○	○	○
14-The e-Government services are available at all times.	○	○	○	○	○
Use of e-Government services					
15-I frequently use e-Government services.	○	○	○	○	○
16- I use e-Government services whenever possible to do my work.	○	○	○	○	○
17-I am dependent on e-Government systems to acquire information or services from the Government.	○	○	○	○	○
User Satisfaction with Government services					
18-E-Government services have met my expectations in interacting with the Government departments.	○	○	○	○	○
19-I believe, e-Government services have met my needs of interacting with the government departments.	○	○	○	○	○
20- Overall, I am satisfied with my experience of using e-Government services.	○	○	○	○	○

For the following statements please select the relevant response which reflects your experience of e-Government use.

The following statements describe different types of e-Government activities. Please select the appropriate response that reflects your frequency of performing these activities.

Statement	Never Used	Almost never	Occasionally/ Sometimes	Almost every time	Every time
Accessing e-Government services for acquiring information, e.g. viewing COVID-19 case numbers.	○	○	○	○	○
Downloading documents or submitting forms using e-Government applications, e.g. submitting online tax returns.	○	○	○	○	○
Interacting with Government departments, e.g. by email.	○	○	○	○	○
Transacting with Government departments, e.g. to pay a bill or a fee.	○	○	○	○	○
Posting opinions or lodging online complaints, e.g. lodging a complaint on Pakistan Citizen Portal.	○	○	○	○	○

PART C: TECHNOLOGY READINESS

The following questions pertain to your perceived readiness for new technologies. Some examples of new digital technologies include mobile or smart phones and social media. Please indicate your level of agreement or disagreement with each of the following statements by selecting the appropriate field.

Optimism with using new technology

21- I think new technologies contribute to a better quality of life.	○	○	○	○	○
22- New technologies give me greater freedom of movement.	○	○	○	○	○

23- Technology enables greater control over my daily life. Technology enables me to better organise my daily life.	○	○	○	○	○
24-Technology makes me more productive in my daily life.	○	○	○	○	○
Innovativeness using new technology					
25- Other people come to me for advice on using new technologies.	○	○	○	○	○
26- Usually, I am among the first in my circle of friends to use new technologies.	○	○	○	○	○
27- Generally, I am able to use new technology products and services without acquiring help from others.	○	○	○	○	○
28-I am up-to-date with latest technologies in my area of interest.	○	○	○	○	○
Discomfort with using new technology					
29- I am not comfortable asking for technical help (support) from a product or service provider.	○	○	○	○	○
30-The information provided by technical support lines is not easy for me to understand.	○	○	○	○	○
31- I think technology products and services are generally complex to use.	○	○	○	○	○
32- As new technology is not dependable, caution should be exercised in replacing people with technology for important tasks.	○	○	○	○	○
Insecurity with using new technology					
33- People are too dependent on technology to perform their routine activities.	○	○	○	○	○
34- Too much technology usage lowers the quality of relationships by reducing personal interaction.	○	○	○	○	○
35- I do not feel confident doing business with a place that can only be reached online.	○	○	○	○	○
36-New technology makes it too easy for the Government to keep vigilance on people.					

PART D: IMPACT OF E-GOVERNMENT SERVICES

The last few questions evaluate the impact of electronic government services measured in terms of efficiency, effectiveness and improved democracy. Please indicate your level of agreement or disagreement with the following statements by selecting the appropriate field.

Efficiency

37-Using e-Government services saves me money.	○	○	○	○	○
38- I believe, accessing a government service through electronic means, helps to reduce the cost of provision of that service.	○	○	○	○	○
39- I value the cost savings from using e-Government services.					
40-The e-Government services saves me time.	○	○	○	○	○
41- Using e-Government services, I can accomplish my tasks more quickly.					
42- I can get a comparatively quicker response through e-Government services instead of other means of interaction (e.g face to face).	○	○	○	○	○
43- Using e-Government services help me avoid making direct contact with the government staff.	○	○	○	○	○
44-I can effectively communicate with government departments using e-Government services.	○	○	○	○	○
45- I can efficiently communicate with government departments using e-Government services.	○	○	○	○	○
46- I can flexibly communicate with government departments using e-Government services.	○	○	○	○	○

Effectiveness

47- It is important that I am able to use e-Government services at any time.	○	○	○	○	○
48-Accessing government services from different locations (e.g. home, work, library, post office) is important for me.	○	○	○	○	○
49-The e-Government system allows me to terminate and resume tasks at a later time.	○	○	○	○	○

50- I am able to personalise (tailor a service to individual needs) e-Government services.	○	○	○	○	○
51- I value the personalised aspects of e-Government services.	○	○	○	○	○
52-E-Government services enable me to get useful information about the services offered by the government.	○	○	○	○	○
53- E-Government services help me to better understand the services available to me.	○	○	○	○	○
54-E-Government services provide ready answers to most queries I might have about these services.	○	○	○	○	○
Improved Democracy					
55-I feel that e-Government services are in the citizens' best interests.	○	○	○	○	○
56- I feel comfortable using e-Government services, as it generally fulfils its purpose efficiently.	○	○	○	○	○
57- I feel confident that I can rely on e-Government services to do its part when I interact with it.					
58- I am comfortable relying on the e-Government services to meet its obligations.	○	○	○	○	○
59- E-Government services enable me to get information about issues that are important to me.	○	○	○	○	○
60- I am better informed in general because of using e-Government services	○	○	○	○	○
61- In general, e-Government services have increased my understanding of the issues important to me.	○	○	○	○	○
62- The e-Government services allow me to comment and provide feedback about things that matter to me.	○	○	○	○	○
63- The e-Government services enhance my feelings of being part of an active democracy.	○	○	○	○	○
64- I am confident that comments or feedback given via e-Government service are heard by decision-makers.	○	○	○	○	○

65- The e-Government services help me feel that I am being consulted on important issues.	○	○	○	○	○

For the following last two questions, please comment briefly in the space provided on any challenges and/or impacts of electronic government services.

In your opinion what are the main challenges for adoption of e-Government services and how can these services be improved in Pakistan?

_____
_____
_____

Has access to e-Government services made any impact on your life?

_____
_____
_____