



Implications of Socio-Technical Interactions for e-Government Implementation and its Success

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Abbreviations

AMMS	Advanced Manpower Management System
API	Application Programming Interface
APM	AMMS Project Manager
CBO	Central Bank of Oman
CCN	Commercial Certification Number
CDs	Compact Disks
DG	Director General
DGeGS	Director General for e-Government Services
DGI	Director General for Information
DGIT	Director General of Information Technology
DID	Director of Integration Department
DIT	Director of IT Department
DMB	Digital Media Broadcasting
ESB	Enterprise Service Bus
ESE	e-Service Executive Consultant
EU	European Union
FIR	Fourth Industrial Revolution
FTA	Free Trade Agreement
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GISF	Government Information Sharing Framework
HDCM	Head of Data Centre Management
HDI	Human Development Index
ICT	Information and Communication Technology
III	Inter-organisational Information Integration
IPM	InvestEasy Project Manager
IS	Information Systems
IT	Information Technology
ITA	Information Technology Authority
ITU	International Telecommunication Union
KPIs	Key Performance Indicators
LGA	Local Government Authority
LTI	London Tavistock Institute
MM	Muscat Municipalities
MOAG	Ministry of Agriculture
MOCI	Ministry of Commerce and Industry
MOCS	Ministry of Civil Service
MOE	Ministry of Education
MOECA	Ministry of Environment and Climate Affairs
MOF	Ministry of Finance
MOH	Ministry of Health
MOHE	Ministry of Higher Education
MOJ	Ministry of Justice
MOLA	Ministry of Law Affairs
MOMP	Ministry of Manpower
MORM	Ministry of Regional Municipalities
MOSD	Ministry of Social Development
MPLS	Multiprotocol Label Switching

MR	Marketing Researcher
MVP	Minimum Viable Product
NCSI	National Centre of Statistics and Information
OCCI	Oman Chamber of Commerce and Industry
OeGAF	Oman e-Government Architecture Framework
OeGF	Oman e-Governance Framework
OGN	Oman Government Network
OPEC	Organisation of Petroleum Exporting Countries
PAMR	Public Authority of Manpower Records
PASI	Public Authority of Social Security
PGM	Project General Manager
PKI	Public Key Infrastructure
PMO	Project Management Office
PMOF	Project Management Officer
PMOM	Project Management Office Manager
PMP	Project Management Professional
PTM	Project Technical Manager
ROP	Royal Police Oman
SDGs	Sustainable Development Goals
SI	Systems Integrator
SLA	Service Level Agreement
SOA	Service Oriented Architecture
SP	Systems Programmer
SPC	Supreme Planning Council
SSA	Senior System Administrator
STS	Socio-Technical Systems
UAE	United Arab Emirates
UK	United Kingdom
US	United States of America
USA	United States of America
VPM	Project Manager of The Implementation Vendor
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

Abstract

e-Government projects have become a strategic enabler for public administration reform and the development of the local economy. However, there is an agreement among researchers that most e-Government implementation projects fail to achieve their goals and deliver their desired benefits. One important reason for this failure reported in the literature is that current e-Government system designs do not meet the socio-technical reality of e-Government, which is shaped by several environmental, social, political, and technical forces. Researchers emphasise that e-Government projects can continue to fail unless equal attention is devoted to these diverse aspects. On the other hand, the current e-Government stage/maturity models (e.g., Layne & Lee, 2001) offer only little awareness about the effects, implications, and attributes of the changes happening within and between organisations as e-Government projects go through design and implementation, thus falling short to fully address the socio-technical nature of e-Government. Moreover, little is known about not only how and in what ways social and technical factors interact and affect each other but also the implications of their interactions for e-Government implementation and its success. This research is set to investigate the implications of socio-technical interactions for implementing e-Government and its success, using the lens of socio-technical systems (STS) theory.

This study was conducted within the previously unexplored setting of Oman using the multiple case-study method. Further, it employed semi-structured interviews as the primary data collection instrument, supported by archival analysis as a secondary data source. Oman was chosen as the context for the study due to its rapid socio-economic development in embracing an e-Government design for public administration reform.

The research outcome indicated that the socio-technical factor effects identified in this study are mostly consistent with those reported in the extant literature. The findings of the analysis of socio-technical factors' interaction, presented in terms of theoretical propositions, further support the extant literature. They demonstrated that examining e-Government implementation from the holistic view of STS theoretical lens can help significantly understand the complexity of e-Government systems.

This outcome will help in identifying the various tangled issues attached to the project's implementation and contribute towards lowering the failure rates of e-

Government projects. It can also assist e-Government researchers by offering them a holistic analysis of this phenomenon to avoid the pitfalls resulting from focusing on specific aspects or dimensions of e-Government.

The results of this study also offer a diagnostic tool to practitioners to gain better control over e-Government projects and provide great opportunities for avoiding potential failure and increasing the rate of success, either entirely or partially.

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CHAPTER 1: Introduction

1.1. Introduction

According to Gil-Garcia and Flores-Zúñiga (2020), the examination of e-Government success or failure falls into two key areas: (1) the implementation of e-Government systems by government organisations and (2) the adoption of e-Government systems by citizens. The scope of this research can be located within the former area, as it investigates the implications of socio-technical interactions for introducing and implementing e-Government and its success. In the context of this research, implementation refers to the set of capabilities, resources, and actions of government organisations (Gil-Garcia & Flores-Zúñiga, 2020) necessary for deploying and running an e-Government system. In the same context, success can be defined as the outcome of the e-Government system where it achieves its intended objectives and becomes operational at the planned time and cost (Fortune & Peters, 2005), whereas failure is defined as the result where the contrary happens (Danish, 2006; Gunawong, 2017).

This chapter introduces the research project and provides an overview about this study. It lays down the research background and elaborates the various motivations for conducting this research. Including this introductory section, this chapter is divided into eight segments: Section 1.2 establishes the research background. Section 1.3 addresses the research problem and motivations to conduct the study. The research scope is outlined in Section 1.4, succeeded by the research question and objectives in Section 1.5. Section 1.6 highlights the relevance and significance of this research with regard to the e-Government implementation area. The thesis outline and structure then follow in Section 1.7. Finally, the chapter concludes with a summary of these main points in Section 1.8.

1.2. Research Background

e-Government projects are difficult and complex in nature (Glyptis et al., 2020). Because of their complexity, they are risky and prone to failure (Gunawong & Gao, 2017). It is not uncommon that many e-Government projects fail to achieve their objectives and, hence, also deliver their potential promises (Madsen, Berger, &

Phythian, 2014). Although technology advancement in this area seems promising, researchers have remained sceptical (Choi & Chandler, 2020). The literature reveals that most e-Government projects fail (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016; Choi & Chandler, 2020; Dawes, 2009; Heeks, 2003, 2006; Twizeyimana & Andersson, 2019; Zhu, & Kindarto, 2016). The failure is either complete, where systems are never implemented, or partial, by which key objectives are not met or have not produced the expected benefits (Anthopoulos et al., 2016; Goldfinch, 2007; Gunawong & Gao, 2017; Heeks, 2003, 2006). In this regard, Pierson and Thompson (2016) note that the rate of fully successful IT projects in the public sector ranges between 15 and 30%.

To this point, numerous stories of failed projects have been reported in various literatures. For example in the United Kingdom (UK), the government declared maximum spending of \$4 billion with a failure rate reaching close to 70% (Johnson & Hencke, 2008). Similarly, in the United States (US), Mergel (2016) notes that most high-risk e-Government projects undertaken by the US federal government fail: 94% of IT projects were over budget and behind schedule, and 40% were never finished. The same has been conveyed by Snead and Wright (2014), who indicate that because of poor management in technology investment, US federal e-Government projects ran exponentially over cost, were behind the scheduled time for deployment, and delivered obsolete solutions at the time of completion. Likewise, in New Zealand, Goldfinch (2007) found that the total success rate of public information and communication technology (ICT) projects was below 40%. Even e-Government systems that were deemed successful were operationally inefficient (Snead & Wright, 2014), had not made a sound contribution to people's lives (Anthopoulos et al., 2016; Guha & Chakrabarti, 2014), and had failed to fulfil the expectations of its stakeholders (Anthopoulos et al., 2016; Choi & Chandler, 2020; Moynihan & Lavertu, 2012; Snead & Wright, 2014).

Several reasons for the failure in e-Government projects have been discussed in the literature, ranging from poor planning to inappropriate implementation (Choi & Chandler, 2020), which are mainly related to technical, social, organisational, cultural, and human behavioural factors. In this respect, the United Nations (UN) reported that the main reasons attributed to e-Government project failure include the lack of understanding of citizens' needs, inadequate infrastructure, ineffective delivery of

services, lack of stakeholders' trust, marketing and confidentiality (United Nations, 2008), unclear objectives, failure to engage stakeholders, lack of cost-benefits analysis, lack of evaluation (United Nations, 2020), and other social and cultural issues.

Researchers have also mentioned reasons related to design–reality gaps (e.g., Anthopoulos et al., 2016; Guha & Chakrabarti, 2014; Heeks, 2003, 2006), missing real business needs, ineffective project management, and unrealistic planning (Anthopoulos et al., 2016). Other reasons, as outlined by Luna-Reyes and Gil-Garcia (2011), are the consequences of the government's lack of understanding of the relationship amongst the various aspects involved in e-Government implementation including technological, organisational, institutional, and socio-economic. Moreover, it has been observed that despite the emergence of more effective technologies and innovative development approaches, which have the ability to improve workplace environments and project management, the sought-after benefits are unlikely to be achieved without an appropriate account of behavioural and organisational variables (Davis et al., 2014).

The literature also indicates that e-Government projects' failure has resulted in many negative consequences including the loss of institutional credibility, loss of time and money, increased cost (Twizeyimana & Andersson, 2019), loss of trust, and persistent resistance-to-change for future public transformation initiatives (Heeks, 2003). For example, Mergel (2016) articulates that the price of the overall debugging efforts needed to launch the 'Healthcare.gov' portal of the US, which provides health insurance to citizens, had exceeded the original contract price by several million dollars.

In this respect, Damodaran, Nicholls, Henney, and Land (2005) indicate that ignoring environmental, organisational, and social contexts under which the technical aspects of the e-Government system function often leads to an unrealistic implementation and low acceptance by citizens, which in turn increases the rate of failure. The authors reviewed real-life stories of some large-scale information systems implementation projects in the public sector of the UK. They were initiatives that failed because they neglected social design aspects while focusing on technical aspects. The cases reported

included the UK Passport Office, the London Ambulance Service Despatch System, and the Child Support Agency (Damodaran et al., 2005).

Furthermore, Luna-Reyes, Zhang, Gil-García, and Cresswell (2005) emphasise that information systems implementation projects can fail to deliver the expected outcomes unless an equal balance is achieved while taking social and technical factors in account. They argue that social and organisational factors, rather than technical factors, are the most likely reasons of failure. The same has been addressed by Heeks (2006) who states that hard management approaches, which are technology-deterministic and organisational objectivity-centric, are commonly adopted while dealing with e-Government implementation. Heeks (2006) further argues that such approaches are the singular root cause of e-Government implementation failure, where designs do not meet the nature of the organisational context and the socio-technical realities of e-Government. In line with Heeks's (2006) argument, Davis et al. (2014) assert that most of the practical approaches in organisational changes are based on industrial standards of technology, which often focus on economic performance but at the expense of human needs. In the same vein, Eason (2014) observes that users' tasks in most cases were badly aligned with computer systems, resulting in many systems being rejected or worked around. The inability to properly forecast, or at least understand, how individuals can comply or react to sustainable techniques can lead to unsuitable design and consequently ineffective operations as well as unintended outcomes (Wener & Carmalt, 2006).

The findings of Davis et al. (2014) maintained that the common factors attributed to system failures include “myopic mind-sets, complacent attitudes, failure to learn lessons or heed expert advice, poor training and education, poor communication, lack of leadership, failures of technology, inappropriately designed infrastructures, lack of role clarity and poor inter-agency coordination” (p. 174). The authors suggest that the issue of information systems project failure in organisations has been under examination, calling for more research particularly for those implemented in the public sector.

In the context of developing countries, prior findings reported that e-Government implementation projects have been largely unsuccessful. For example, Gunawong and Gao (2017) convey that 80% of e-Government projects have failed to entirely meet

their sought-after objectives. Results of the studies conducted in this context showed significant failure rates, with 35% classified as total failures, around 50% classified as partial failures, and only 15% deemed successful (Heeks, 2008; Heeks & Bailur, 2007). In addition, Guha and Chakrabarti (2014) state that most developing countries are unable to meet infrastructure requirements of e-Government projects and mostly end in failure. Likewise, the UN's (2020) e-Government survey indicates that many developing countries continue to face challenges linked to multiple contextual factors such as resource constraints, lack of digital infrastructure, and insufficient human capacity as well as issues of digital inclusion, data privacy, and cybersecurity.

Further in the same context, Ali, Weerakkody, and El-Haddadeh (2009) conducted a comparative case study in two contexts (i.e., a developed country, the UK, and a developing country, Sri Lanka), which allowed them to highlight the influence of cultural differences on e-Government implementation. Their findings outlined that most developing countries rely on foreign specialists for information systems consultation, who often omit the consideration of domestic values and the country's particular cultural context, resulting in failure. Gunawong and Gao (2017) report that the 'Smart ID Card' project of Thailand was abandoned. The reason was their failure to create and maintain an inter-relationship between the actors (i.e., actor-network) throughout the project cycle. Likewise, Al-Moalla and Li (2010) related the slow adoption of the 'e-Procurement System' in the United Arab Emirates (UAE) to the lack of change in management's mindset.

While there has been scarce research on developing countries, studying technology implementation in this context enriches the body of knowledge as it considers contextual and cultural factors leading to success or failure.

To this end, researchers have developed and used models and frameworks with the aim of identifying and understanding the various factors that influence decisions on the implementation and adoption of e-Government projects (Cuadrado-Ballesteros, Santis, & Bisogno, 2021; Damodaran et al., 2005; Dawes, 2009), such as maturity models (e.g., Layne & Lee, 2001). While these studies have offered indispensable knowledge to guide implementation, the apparent high rate of failure plaguing e-Government projects and their slow adoption suggest that current e-Government stage models are insufficient and have several limitations.

As an attempt to improve the success rate, Heeks (2006) calls for more realistic ‘hybridised’ management methods that can reduce the gap between the specific organisational context and the implications of the technical solution. He notes that a system that works fine in a well-managed context may not function at all in a context of political conflicts and cultural conventionality. Some scholars (Cuadrado-Ballesteros et al., 2021; Dawes, 2009; Heeks, 2006) describe e-Government systems as socio-technical systems (STS) encompassing a technical and human combination. In this sense, they argue that both social and technical aspects must be addressed when managing e-Government projects, stressing that the failure of e-Government systems is more attributed to the improper management of social aspects than to technological issues. e-Government systems and their related processes are intrinsically socio-technical in nature, where the outcome is derived by individuals interacting with technology. It is noteworthy that this outcome is not attainable either by technology or by humans operating in isolation (Damodaran et al., 2005). In support of this, Irani, Elliman, and Jackson (2007) suggest that in light of the continued changes in the organisational, technical, and social elements associated with e-Government, an interdisciplinary strategy that pieces these elements together should better align with the requirements of prospective e-Government stakeholders.

However, several technology-change projects – mostly those having a large scope – tend to concentrate exclusively on their design and implementation rather than the development of the composite structure in a holistic manner. In other words, they do not meet the socio-technical reality of e-Government projects, which is shaped by several environmental, social, political, and technical forces. In truth, of the aforementioned factors, technology is only one dimension (Damodaran et al., 2005; United Nations, 2020). For instance, UN (2020) argues that the exclusive focus on technology was seen as restricting and even causing e-participation projects, in particular, to fail. There is a consensus in the literature over such one-sided focus being the key reason of e-Government project failure (e.g., Damodaran et al., 2005; Davis et al., 2014; Heeks, 2006; Luna-Reyes et al., 2005). Most crucially, a socio-technical design of e-Government projects shall be set up to support the active participation of citizens, users, business, and other stakeholders in order to realise their anticipated benefits (Damodaran et al., 2005).

In this context, many researchers have emphasised that in order to successfully deliver the e-Government services, socio-technical approaches need to be incorporated in designing and delivering e-Government services (e.g., Damodaran et al., 2005; Dawes, 2009; Gibreel & Hong, 2017; Heeks, 2006). For example, Damodaran et al. (2005) state that e-Government service delivery “requires the development of socio-technical sub-systems, combining technology and communication processes which meet the task needs of citizens and the procedural and legal requirements of local government” (p. 9). Yet, current literature still has not developed a viewpoint on how and in what ways social and technical factors interact (i.e., affect each other). Additionally, it also does not offer enough insight on the consequent implications of e-Government implementation, since current studies have largely concentrated on technology aspects (Gibreel & Hong, 2017). Therefore, examining the implications of socio-technical interactions for e-Government implementation will offer significant insights on their reasons for failure. This thesis is located within endeavours to explore the implications of socio-technical factors for e-Government implementation and its success.

1.3. Research Problem and Motivation

As outlined above, the existing literature still lacks the view that fully addresses the effects and implications of the changes happening in organisations during e-Government implementation efforts. This calls for carrying out alternative theorisations that can offer a holistic model using different theoretical lenses such as the STS theory.

In order to contribute to mitigating the risk of e-Government project failure, this research suggests that a socio-technical approach is desirable to understand the complex interlinks among socio-technical factors impacting e-Government implementation. In doing so, the review of STS literature identified that STS approaches have been adopted in many application domains: for instance, information systems (e.g., Bostrom & Heinen, 1977a; Heeks, 2003), digital multimedia broadcasting (Shin, Kim, & Lee, 2009), health informatics (Berg, Aarts, & Lei, 2003), and environmental sustainability (Davis et al., 2014). On the other hand, with regard to e-Government projects, it was found that the current research adopting STS theory is limited. The list of the (few) researchers who have conducted this study includes Damodaran et al. (2005); Olphert and Damodaran (2007); Welch and Pandey (2008);

Dawes (2009); Soumia, Rabah, Mouhamed, and Abdelaziz (2011); Nograšek and Vintar (2011); Nograšek and Vintar (2014); Yang and Wu (2016); Kompella (2017); Gibreel and Hong (2017); Zhang, Tang, and Jayakar (2018); Bakunzibake, Klein, and Islam (2019); and finally, Tangi, Janssen, Benedetti, and Noci (2020). However, these studies do not empirically address the implications of socio-technical interactions on e-Government implementation (key literature gaps are discussed in Chapter 2, Section 2.5).

This research is motivated by the scholarly calls to adopt a more holistic approach to e-Government implementations using STS theory lens as a contribution towards reducing the rate of projects failure. In addition to these studies, this research is also driven forward by the researcher's prior practical experience in the field of e-Government implementation, where he has witnessed several challenges, despite the persistence of advanced technology, which obstructed the project's success. All these issues have collectively motivated the researcher to conduct this study.

Therefore, it is desirable to propose a holistic theoretical approach that fits the e-Government context by taking the current STS design models/approaches forward.

1.4. Research Scope

The purpose of this research is to find out about the implementation of e-Government projects and the potential means through which it can be better managed in order to reduce the risk of failure. This research looks at the implementation as the overall process, from a macro level perspective, without deeply tapping into the details of the technical process involved in the implementation of the projects. "Macro factors play a decisive role for e-Government. For instance, the social, political and economic state in relation to the nation's e-Government maturity are vital" (Glyptis et al., 2020, p. 2). Here, implementation, as mentioned before, refers to the set of capabilities, resources, and actions of government organisations (Gil-Garcia & Flores-Zúñiga, 2020) necessary for the deployment and running of an e-Government system. The implementation process could include tasks such as planning and formulating strategies, (re)designing business processes, gathering and analysing requirements, developing or customising a computer information system, and delivering electronic services (e-Services) for public use. However, e-Government adoption and diffusion are out of the scope of this research. Nevertheless, the main intent is to look at the big

picture of e-Government implementation and view the problem holistically from a socio-technical perspective.

This study of implementation in this research is conducted in a retrospective manner, where the researcher is not involved in the actual implementation of the projects under study but rather acts as an ‘outside researcher’ (Walsham, 2006) or observer and asks questions about what happened during the implementation and aftermath of its introduction and launch. In such big projects, the concern is not about the technical implementation but about the process of thinking, designing, putting the systems/e-services together, and getting them run which involves various interactions among the users and stakeholders. Eason (2014, p. 216) puts it thus: “Probably the most common way of utilizing sociotechnical systems theory is as a summative evaluation framework for assessing what happened when a major change, usually a new technical system, was made to a work system.” The findings of the study are analysed to understand the impacts of socio-technical factors, when they interconnect and interact, on the implementation of the projects and whether implications from such effects led to success or failure.

This research adopts the lens of the STS theory to establish the theoretical concept of this study. The theoretical review of this research draws ‘mainly’ on STS theory and relevant research from the domains of information systems, public administration, and e-Government systems. Although the STS theory was originally found to serve the context of the organisation (e.g., Bostrom & Heinen, 1977a, 1977b), it can be adapted and applied to other contexts (i.e., e-Government systems in this case) as suggested by Davis et al. (2014). In doing so, e-Government projects are viewed as an STS that is shaped by various socio-technical forces (see also Heeks, 2006).

The Oman government is taken as the context of this study. Oman is a developing state heavily relying on oil resources that are dwindling. However, the country has adopted a diversification policy to reduce this over-reliance of the economy on the oil industry. The e-Government development strategy in Oman is an important initiative toward resource diversification and more efficient public governance. Oman’s e-Government project is witnessing and going through a rapid development. In doing so, the e-Government implementation is investigated from a socio-technical perspective. It is

normally attended to and managed through a body of projects usually involving multiple public and private organisations.

Accordingly, this study regards the implementation projects as the units of analysis, where the study explores a number of e-Government projects led by public government organisations. The projects are at the national level of significant socio-economic impact. The e-Government systems undergoing implementation are of multiple stakeholders' and organisations' interest. Thus, such projects involve extensive inter-organisational collaboration, and their execution requires data sharing, business process and information systems integration, and IT infrastructure interoperability, towards which this research directs its attention. Therefore, the purpose of the field work is to collect data from respective organisations through interviews and other secondary methods such as document archives. This is done with the aim of informing the theoretical proposition of the research. The participants engaged in this study are the different stakeholders of the projects, including policy and decision makers, IT managers and professionals, system engineers and developers, project managers and vendors, and operational staff. Although concerned citizens' influence is significant in such government initiatives, the data collection process included only few participants from the citizenry, since it was the understanding of the researcher that they have not been closely involved in the course of the implementation. Also, the adoption and diffusion of e-Government is not covered under the scope of this study.

1.5. Research Question and Objectives

Adopting an STS theory lens, this study aims to explore the implications of the interactions among socio-technical factors for e-Government implementation and its success.

Considering the identified literature gaps (key literature gaps are discussed in Chapter 2, Section 2.5), this study employs the lens of the STS theory to enable a holistic analysis of the e-Government phenomenon. Drawing on the existing STS models that are widely used in the literature (e.g., Bostrom & Heinen, 1977a, Davis et al., 2014), it seeks to develop and propose an STS-based conceptual framework for e-Government implementation. The STS approach provides a holistic view to e-Government implementation, considering social, technical, organisational, and

environmental factors. The research outcome is expected to offer an extension to existing models.

Guided by the above line of theory, the current study will attempt to answer the following research question: *What are the implications of socio-technical interactions for the success of e-Government implementation, and how they may be addressed to reduce the risk of e-Government projects' failure?*

Thus, to answer the research question, we posit three actionable stepwise stages to carry out the study. These stages are expressed as objectives in the following order:

- Objective 1: To identify the key socio-technical factors involved in e-Government implementation from the related literature and to develop an STS-based conceptual framework for e-Government implementation.
- Objective 2: To empirically investigate the effects of the socio-technical factors on e-Government implementation and its success.
- Objective 3: To understand the ways the socio-technical factors interact and affect each other and to address the implications of their interactions for e-Government implementation and its success.

1.6. Research Relevance and Significance

This research will attempt to contribute to both theoretical and practical sides of e-Government implementation. The study empirically examines the implications of socio-technical factors' interactions for e-Government implementation using the lens offered by the STS theory. This study develops a socio-technical framework that acts as a guidance for the research process and can be useful to complement future e-Government research. The framework is also used to analyse the environmental, organisational, social, and technological factors that influence e-Government implementation. It is anticipated that the conceptual framework would be useful to e-Government researchers and practitioners in providing integrative theoretical perspectives for conducting a complete analysis of the phenomenon and avoiding the pitfalls that result from studies with a narrow focus (i.e., only on specific aspects or dimensions of e-Government implementation).

As mentioned earlier, examining the implication of socio-technical interactions for e-Government implementation sheds more light on this phenomenon to reveal and

further explain its reasons for failure. It will contribute to the body of knowledge on e-Government and information systems development and provide further theoretical and contextual insights regarding why most ICT implementation initiatives in the public sector have been unsuccessful. It is a hope that this study will offer a kind of prognosis to bring down e-Government implementation failure rates.

At the same time, the study presents a new challenge, which is that the e-Government application domain is used to reflect on the STS theory and contribute to its evolution. Researchers such as Bostrom and Heinen (1977b), Davis et al. (2014), Eason (2014), and Mumford (2006) have called for the expansion of STS conceptualisation and practice. They also appeal for STS core principles to be applied to new research areas extending the typical focus on new technology and work organisations. They argue that applying STS to new fields of study can help investigate modern critical issues while simultaneously progressing the STS theory.

Various studies agree that the implementation of e-Government systems is difficult and complex. To elaborate, there are unresolved socio-technical issues in this respect, given that socio-technical factors may vary according to the domain or context. Conducting the research in a developing context and learning from Oman's experience with e-Government implementation would bring useful contextual and cultural insights that would enrich this research area.

1.7. Thesis Outline

Phillips and Pugh (2005) recommend that a PhD thesis should embrace four key elements, which are *background theory*, *focal theory*, *data theory*, and *contribution*. Accordingly, as presented in Table 1.1, this PhD thesis demonstrates four key stages: (i) introducing the research and reviewing the literature; (ii) developing a conceptual framework; (iii) addressing the most appropriate research methodology suitable for this research and collecting and analysing the collected data; and (iv) discussing the findings with the past literature and drawing a conclusion and recommendation. As shown in Table 1.1, this particular research has been divided into seven chapters, which are summarised as follows:

Thesis Structure		
Background Theory	Chapter 1	Introduction <i>Thesis outline, research question, aim and objectives</i>
	Chapter 2	Literature Review <i>Critical and systematic review and analysis of the existing relevant literature</i>
Focal Theory	Chapter 3	Conceptual Framework <i>An STS conceptual framework for e-Government implementation</i>
Data Theory	Chapter 4	Research Methodology <i>Research philosophy, approach, protocol, and methods used to set up and undertake data collection and analysis</i>
	Chapter 5	Cases Studies Analysis and Findings <i>Within-case analysis and findings of individual case studies, and comparative analysis of the synthesised findings.</i>
Research Contribution	Chapter 6	Analysis of Socio-Technical Interactions and their Implications for e-Government Implementation and its Success <i>Analysis and discussion of social-technical interactions and their implications for e-Government implementation and its success, and propositions building.</i>
	Chapter 7	Conclusion <i>Research outcome, contribution, implication, limitations, and future research direction</i>

Table 1.1: Thesis Structure

Chapter 1 situates the research topic within the broad area of research, then defines the research problem, and subsequently presents the various motivations of this research. This also included reviewing the literature that highlighted the need for investigating the implications of socio-technical interactions for e-Government implementation. It also emphasises on the need to address the shortcomings in the current literature. The aim and objectives of this study were laid down in the same chapter.

Moving ahead, Chapter 2 aims to build a theoretical foundation for the research through a critical review and analysis of the existing relevant literature. It synthesises the existing studies on the concepts of e-Government and its implementation, the current issues in e-Government implementation, and associated projects failures. The chapter also sheds light on STS theory, its creation and historical evolvment, principles, and its applications to different domains. Following this, it highlights the need to view e-Government as a socio-technical system and rethink its implementation from this angle. The chapter also offers a systematic literature review to identify the gaps in the extant STS literature in relation to e-Government implementation.

Chapter 3 develops an STS conceptual framework of the key socio-technical factors affecting e-Government implementation. It also highlights the interactions of the socio-technical factors and their implications for e-Government implementation. This chapter reviews the relevant socio-technical literature on information systems, public administration, and e-Government implementation with the particular aim of identifying the key socio-technical factors affecting e-Government implementation.

Additionally, the research philosophy followed in this study is discussed and justified in Chapter 4, which further outlines the methodology used, the approach and methods used to conduct fieldwork, and the rationale behind the selection of the interpretive qualitative research approach to collect the data from three Omani public organisations. The chapter lays down the criteria for identifying and selecting the particular case organisations and the respective e-Government projects. Furthermore, it describes the research design for data collection and analysis. Finally, it highlights the ethical code of conduct followed during the processes of data collection and analysis.

The key findings of the empirical investigation of each case study are discussed in Chapter 5. An overview of the context in which data collection took place is presented followed by the individual analysis of each case organisation. The chapter also offers a description of the comparative importance of the socio-technical factors.

Chapter 6 analyses the interactions of the social-technical factors in order to understand the implications of these interactions for e-Government implementation and its success. It also establishes a dialogue of discussion of the interactions outcome with the relevant literature presented in Chapters 2 and 3 in order to develop a solid and a more comprehensive understanding of the implications. These implications will be conveyed as theoretical propositions for future research.

Chapter 7 concludes this study by presenting the lessons learned from the study with the most important findings. It discusses the key theoretical, methodological, and empirical contributions of the study and highlights the research implications. The chapter concludes by outlining the research limitations and suggesting future directions that this research area can take.

1.8. Summary

This chapter introduced the overall research project and thesis structure. It laid down the research background and showed the various motivations for conducting this research: including identifying the theoretical gap in literature and highlighting the need to investigate the implications of socio-technical interactions for e-Government implementation. It also introduced the research question, aim and objectives, research methodology, and potential contribution of this study. Based on this, the thesis write-up progresses to the succeeding chapter where the related literature is reviewed and evaluated in order to establish a background to the research topic.

CHAPTER 2: Literature Review

2.1. Introduction

The previous chapter introduced the research background, aim and overall structure of this research. This chapter aims to build a theoretical foundation for the research through a critical review and analysis of the relevant literature. It synthesises the existing studies on the concepts of e-Government and its implementation, the current issues in e-Government implementation and associated projects failures and the need to view e-Government as STS and rethink the implementation from this lens. The chapter also seeks to identify the literature gap in the area of this research by conducting a systematic literature review. The examination of these topics frames this research.

The literature, which has been reviewed to develop this chapter, includes paper articles and textbooks from the fields of e-Government, information systems/technology, public administration/management, ergonomics, and cross-disciplinary sources. This chapter is structured into six main sections including the current one. Section 2.2 aims to provide an overall background about e-Government, its emergence, its concept, and significance. Section 2.3 presents discussions on e-Government implementation, along with the development process, the underlying models, and the challenges facing e-Government implementation and its success. This is followed by Section 2.4, which discusses STS, theories, approaches, and designs as well as the relationship between STS and organisations which are often the focus of technology adoption. It also discusses the arguments of applying STS studies to e-Government systems. Section 2.5 presents a systematic literature review of the e-Government literature with particular relevance to STS and highlights the key theoretical gaps in the current literature. The chapter concludes with a summary in Section 2.6.

2.2. e-Government

In the last few decades, the emergence of ICT has changed the way business is done and influenced people's daily life. ICT has also impacted the work of governments, specifically public administration, through transforming internal operations and facilitating interactions with the external environment (Meijer & Bekkers, 2015). The

use of ICT in the public sector has grown wider and gained more attention from politicians and decision-makers, and become the main priority for policy goals and governments' strategic plans as ways for modernising public services (Gil-Garcia & Pardo, 2005; Meijer & Bekkers, 2015).

It has been argued that the use of ICT in the public sector has been around for more than 50 years (Garson, 2006; Meijer & Bekkers, 2015; Zhang, Xu, & Xiao, 2014). According to Garson (2006) and Meijer and Bekkers (2015), the implementation of technology in governments started with digitisation and automation of internal processes and then evolved into general use by several public organisations. This has further developed into the transformation of the relationship with the external stakeholders. With the rise of the Internet in the mid-1990s (Dawes, 2009; Joseph, 2013), this process has been broadly termed 'electronic government' or 'e-Government' (Alcaide-Muñoz, Rodríguez-Bolívar, Cobo, & Herrera-Viedma, 2017; Meijer & Bekkers, 2015). Therefore, this period has officially witnessed the birth of e-Government. Researchers like Heeks (2006) define e-Government as the use of ICT in the public sector, and thus, argue that e-Government is not just about the Internet, and it has been around for many decades even before the term 'e-Government' was coined. The next sub-section describes the e-Government concept and definitions in more detail.

2.2.1. Definition of e-Government

e-Government services are categorised into four broad categories or dimensions which are: government-to-government (G2G), government-to-citizen (G2C), government-to-employee (G2E), and government-to-business (G2B). Yildiz (2007) has extended these dimensions and suggested two additional categories, which are government-to-civil societal organisations (G2CS) and citizen-to-citizen (C2C). According to Joseph (2013), e-Government services are designed and classified based on the stakeholder or stakeholder groups involved in the interaction with the government for whom the particular service is provided. In addition, e-Government is commonly structured according to the level of administration, such as local, state or federal in some countries; or municipal, county or region in other countries (Joseph, 2013). A stakeholder is defined as a group or an individual who can affect or is affected by the

implementation and adoption of e-Government (Singh, Grover, Kar, & Ilavarasan, 2020). Table 2.1 summarises e-Government dimensions and their respective focus.

The definition and type of e-Government have evolved over time (Madsen et al., 2014). However, there is not yet any universally accepted definition of the e-Government concept (Cuadrado-Ballesteros et al., 2021; Gil-Garcia & Flores-Zúñiga, 2020; Halchin, 2004). Rather, there are various e-Government definitions found in the literature. The following definitions are quoted from past and recent research. Many e-Government definitions have largely highlighted the relevant technological aspects (Choi & Chandler, 2020). For example, West (2004) defined e-Government as “the delivery of information services online via the Internet or other digital means” (West, 2004, p. 16). Another definition, which is close to West’s, suggested by Brown and Brudney (2004, p. 96), is “the use of technology, particularly Web-based Internet applications, by government agencies to enhance access to and delivery of public services”. Likewise, Heeks's (2006, p. 4) definition, “the use of IT by public sector organizations”, falls in the same category but is broader in scope.

Besides the technological aspect, other groups of definitions have emphasised the relationships and service delivery perspectives between the government and its key stakeholders (Choi & Chandler, 2020), utilising e-Government service dimensions (Brown & Brudney, 2001). For example, UNDESA (2001, p. 1) defined e-Government as “utilizing the Internet and the World-Wide-Web for delivering government information and services to citizens”. UNDESA’s (2001) definition focuses on a single group of stakeholders, which is the citizens (i.e., G2C dimension). On the other hand, Fountain (2001) used the term ‘Digital Government’ to denote e-Government. She defined it as “a government that is organized increasingly in terms of virtual agencies, cross-agency and public-private networks whose structure and capacity depend on the Internet and Web” (Fountain, 2001, p. 4). Fountain’s definition highlighted the relationships and communication between different agencies or organisations (i.e., G2G and G2B dimensions), omitting the interaction with citizens. However, Means and Schneider (as cited in Yildiz, 2007, p. 650) defined e-Government as “the relationships between governments, their customers, and their suppliers”; dividing stakeholder groups into two main categories, customers and suppliers, where customers and/or suppliers could be business firms, other governments, or citizens (Yildiz, 2007). In the same vein, Bélanger and Carter's (2012)

definition incorporated all dimensions of interaction and service delivery. They defined e-Government as “the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees, businesses and agencies” (Bélanger & Carter, 2012, p. 364). Meijer and Bekkers (2015) used a similar definition, but from a practice point of view, yet provided an extensive range of e-Government objectives and benefits: “e-Government as a practice can be described as the use of ICT to design new or to redesign existing information processing and communication practices to achieve a better government, especially in the field of electronic service delivery to companies and citizens but also for managerial effectiveness, and the promotion of democratic values and mechanisms” (Meijer & Bekkers, 2015, p. 237).

Drawing on the above definitions, it can be understood that there has been no unified definition agreed upon among researchers. In the context of this research, we argue that e-Government can be conceptualised as the use of ICT by governments along with organisational change for the improvement of governmental operations and structures (Twizeyimana & Andersson, 2019). This includes front-end applications that interact with clients/citizens and other back-office systems supporting governments’ internal operations and the work of the internal employees (i.e., management information systems). Additionally, e-Government covers multiple functions and services delivered to its various groups of stakeholders. Both services and stakeholders of e-Government should be defined and scoped according to the context and needs in which the e-Government system operates.

Dimension	Focus/Objective	Reference
General	Service delivery and access of information	(Brown & Brudney, 2004; Heeks, 2006; West, 2004)
G2C	Service delivery and access of information	(UNDESA, 2001)
G2G, G2B	Relationships and communication between different agencies or organisations	(Fountain, 2001)
G2G, G2B, G2C	Relationships and communication between governments, their customers, and their suppliers	(Yildiz, 2007)
G2G, G2B, G2C, G2E	Efficiency and service delivery improvement to any stakeholder’s groups	(Bélanger & Carter, 2012; Meijer & Bekkers, 2015)

Table 2.1: e-Government Dimensions and Focus

2.2.2. Aim and Significance of e-Government

Over the last two decades, with the development of ICT, e-Government and its implementation has developed and become a strategic enabler for public policy modernisation and reform (Gil-Garcia & Flores-Zúñiga, 2020; Meijer & Bekkers, 2015; Shan, Wang, Wang, Hao, & Hua, 2011), as well as for the development of the local economy. The recent emergence of innovative new media has been a key advancement for e-Government (Meijer & Bekkers, 2015). Since then, e-Government has become a major subject of interest to researchers and practitioners (Glyptis et al., 2020; Shan et al., 2011; Wirtz & Daiser, 2015, 2018) provoking public authorities to reform and enhance their public administration, and provide information and services to citizens, business and other government beneficiaries (Alcaide–Muñoz et al., 2017; Dawes, 2009; Renteria, Ramon Gil-Garcia, & Pardo, 2019; Wirtz & Daiser, 2018). “Terms such as e-voting, e-governance, e-democracy and m-government are emerging as key evolutionary constituents in the e-Government domain” (Joseph, 2013, p. 435).

e-Government aims to provide efficient management of information to the citizens, better service delivery, and empowerment of people through access to information and participation in public policy decision-making (Alcaide–Muñoz et al., 2017; Cuadrado-Ballesteros et al., 2021; Kompella, 2017; Stratu-Strelet, Gil-Gómez, Oltra-Badenes, & Oltra-Gutierrez, 2021; United Nations, 2018; Welch, Hinnant, & Moon, 2005; Wirtz & Daiser, 2018). e-Government also endeavours to provide new opportunities and benefits to its stakeholders around the world (Jaeger & Thompson, 2003; Singh et al., 2020; Snead & Wright, 2014).

ICT plays a critical role in the successes and failures of e-Government projects (Heeks, 2006). Yildiz (2007) outlined some of the examples of how ICT could help governments in achieving potential benefits, such as the creation of interconnectivity, service delivery, efficiency and effectiveness, interactivity, decentralisation, transparency, and accountability. The e-Government standard describes how governments leverage ICT to run their operations, share information and deliver services to their stakeholders (Sun, Ku, & Shih, 2015). The perceived benefits are of multiple perspectives which range between internal (organisational) and external (those perceived by citizens, business, and other stakeholders). They include improved efficiency and effectiveness, cost saving, transparency, equality, service improvement, citizens’ access to government services, reduced corruption, higher quality and

significant return on investment (Algemili, 2016; Khazaei, Akhgar, & Alqatawna, 2016; Kamal, Hackney, & Ali, 2013; Lam, 2005; Pardo & Tayi, 2007; Sun et al., 2015; Wirtz & Daiser, 2018; Yang & Wu, 2013; Yildiz, 2007). Furthermore, e-Government has also proved to be helpful to the society to improve the democratic process by reinforcing citizens' participation in public affairs, increasing citizens' trust in government systems and maximising organisational responsiveness to the changing environment (Alcaide–Muñoz et al., 2017). e-Government is also expected to achieve better governance and enable a transparent accountable management system (Alcaide–Muñoz et al., 2017; Snead & Wright, 2014; Wirtz & Daiser, 2018).

At the same time, e-Government has widely been recognised as the key enabler for providing effective public services and maximising national productivity (Wirtz & Daiser, 2018). In this respect, Nograšek and Vintar (2014) indicate that in the age of e-Government, the role of technology in transforming public sector organisations has increased dramatically. Gil-Garcia and Pardo (2006), similarly, argue that e-Government has been recognised as a potential power for promoting changes in government parameters.

Drawing on the above, it can be argued that e-Government has been around for a while and even before the term 'e-Government' was coined. It has been commonly embraced as a tool to bring public administration into the digital age and modernise public services to interact with citizens and other beneficiaries, while its significance is steadily increasing. However, in the advancement of ICT and the prevalence of virtual interactions in social media, e-Government should not be confined to merely providing modernised public services and efficient internal operations, but should also seek public engagement, democracy, administrative reform and participatory policy-making process (Dawes, 2008; Wirtz & Daiser, 2018).

In recent years, e-Government theoretical development has increasingly evolved as a result of the increasing rigorous empirical multidisciplinary investigations with other research domains like public management, political science (Wirtz & Daiser, 2018) and information systems. Kromidha and Cordoba-Pachon (2014) pointed out that the e-Government field has now become an established and distinguishable body of knowledge among the literature, but issues such as the design-reality gap (Heeks, 2006) have not yet been adequately addressed. Therefore, to have more insights into

the complex structure of e-Government and analyse the interlinked relationships among its various elements, some scholars propose borrowing theories from other disciplines to better understand e-Government phenomena.

The freshness of the e-Government field opens avenues for diverse research opportunities as numerous technological, social, cultural, organisational, and political factors surround the field (Joseph, 2013).

2.3. e-Government Implementation

e-Government implementation is intended to help governments deliver public services and improve relationships with citizens and other beneficiaries like business companies and other governmental bodies (Twizeyimana & Andersson, 2019). Researchers like Scholta, Mertens, Kowalkiewicz and Becker (2019) indicate that, in the information age, e-Government implementation should be tailored to provide proactive services, instead of reactive. They emphasise that mature e-Government systems should be ‘citizen-centric’ and replicate real-life scenarios, possess the capability to anticipate citizens’ needs, and exploit IT to support front-line service providers. However, the citizen-centric concept entails a shift in the mindset of the public sector servants in which decision-makers should view themselves as service providers rather than approvers (Scholta et al., 2019).

While there is no particular model in the extant literature for implementing an e-Government system, any e-Government system, or in particular e-Service, is supported by information systems running in back offices and has certain user-interface methods for access and use. Therefore, the system development life cycle for information systems can be followed in the implementation of e-Government. In this regard, Heeks (2006) describes e-Government implementation in three primary stages: (i) analysis of the current situation and motivations to the new e-Government system, (ii) system design, and (iii) system build-up and use, pertaining to the necessary organisational changes. These stages are illustrated in Figure 2.1. Generally, researchers agree that e-Government implementation is influenced by contextual factors (i.e., context-specific) and not according to one-size-fits-all, i.e., it is dependent on the situational circumstances of the context like human, financial and technical resources, as well as cultural, political, and regulatory stances. As Kromidha and

Cordoba-Pachon (2014, p. 79) put it: “implementation discourses move around online services, regulations and conflicting interest”.

However, the predominant discourse in the vast e-Government literature has articulated and discussed “stage” or “maturity” models as the basic means for e-Government implementation. As indicated by many researchers (e.g., Kromidha & Cordoba-Pachon, 2014; Scholta et al., 2019), the discourse in this perspective has been popularly led by the stage model developed by Layne and Lee (2001) and followed by other researchers (e.g., Andersen & Henriksen, 2006; Coursey & Norris, 2008; Gil-Garcia & Martinez-Moyano, 2007; Gottschalk, 2009; Heeks & Bailur, 2007; Hiller & Bélanger, 2001; Iannacci, Seepma, de Blok, & Resca, 2019; Janssen & Veenstra, 2005; Kromidha & Cordoba-Pachon, 2014; Lee, 2010; Moon, 2002; Renteria, Ramon Gil-Garcia, & Pardo, 2019; Rooks et al., 2017; Scholta et al., 2019; Sandoval-Almazan & Gil-Garcia, 2018; Siau & Long, 2005; Valdés et al., 2011; West, 2004). Therefore, a discussion and a review of e-Government stage models follow.

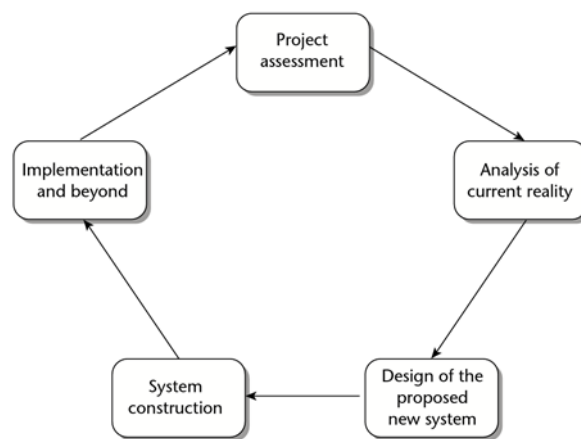


Figure 2.1: e-Government System Development Life Cycle (Heeks, 2006)

2.3.1. Development Stage Models

Stage models are used by many governments to implement their e-Government systems through levels of stages (Scholta et al., 2019; Yildiz, 2007). According to Meijer and Bekkers (2015), the original idea of stage models has emerged from the work of Nolan (1979) and was embraced by e-Government society researchers to represent the evolutionary nature of e-Government. Since they were introduced in the '70s, stage models have been regularly published in several fields (Renteria et al., 2019). It has been argued in the literature that Layne and Lee's (2001) model, which

is presented in Figure 2.2., is the most popular, being cited by various researchers because it addresses the complexity of vertical and horizontal integrations across different organisational functions and service levels of e-Government (Iannacci et al., 2019).

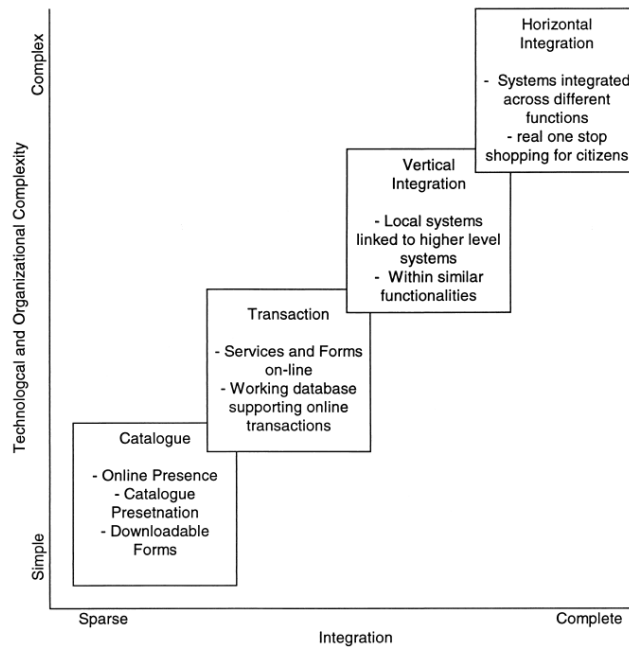


Figure 2.2: An Example of e-Government Stage Model (Layne & Lee, 2001)

e-Government stage models propose that e-Government development can be explained in terms of technological diffusion and level of maturity (Wirtz & Daiser, 2018). Such models predict various stages that anticipate the linear sequence of e-Government development (Rooks et al., 2017) from Web presence to seamless integration and organisational transformation (Coursey & Norris, 2008; Gil-Garcia & Martinez-Moyano, 2007; Heeks & Bailur, 2007; Iannacci et al., 2019; Meijer & Bekkers, 2015). The stages (Layne & Lee, 2001) commonly exemplify presentation of information on the Web, interaction with citizens, online service transaction, integrated e-Government services via a single interface (or portal), and citizens' participation in the decision-making process (Scholta et al., 2019). The final stage encompasses vertical and horizontal integration, where a beneficiary can contact one point of government to run a completed service transaction (Scholta et al., 2019). However, not all models have the same number of stages. For example, Layne and Lee's (2001) model is divided into four stages, which are cataloguing, transaction, vertical integration, and horizontal integration, whereas Siau and Long's (2005) model,

for instance, encompasses five stages, which are Web presence, interaction, transaction, transformation and e-democracy.

Current stage models emphasise the need for IT system interoperability, standardisation and integrated databases (Scholta et al., 2019). They stand out as a helpful tool to government decision-makers to guide e-Government implementation (Kromidha & Cordoba-Pachon, 2014), identify the current state of e-Government in terms of readiness and achievement, assess the resources and capabilities of government organisations toward engaging in successful e-Government projects (Renteria et al., 2019), scope and plan the upcoming development, communicate the development strategies with the various stakeholders, as well as guide academics to enlighten future e-Government research (Scholta et al., 2019). Following this, a review of commonly established stage models is presented.

Based on empirical observations, Layne and Lee (2001) posited a model of four stages, which are cataloguing, transaction, vertical integration, and horizontal integration. This model argues that e-Government develops and moves forward as the technological complexity increases. The cataloguing stage represents the Web presence of the government agency. This stage is limited to providing information to the stakeholders and acts as a channel of one-way communication from the government to stakeholders. The transaction stage enables stakeholders to perform electronic transactions and thus allows two-way communications. The vertical integration stage connects different jurisdiction levels of the same agency. It integrates local, state, and federal governments with different functions or services of government. Finally, the horizontal integration stage integrates the services of different agencies in the same jurisdiction level.

Based on Layne and Lee's (2001) stage model, several researchers have then extended this model and built upon it. For example, Moon's (2002) model proposed five e-Government evolutionary stages (Iannacci et al., 2019): stage 1, simple information dissemination (one-way communication); stage 2, request and response (two-way communication); stage 3, service and financial transactions; stage 4, horizontal and vertical integration; and stage 5, political participation. Moon's (2002) approach however suggests that e-Government implementation may not happen sequentially,

while certain stages could be omitted or partly fulfilled, and multiple stages could be developed simultaneously.

Andersen and Henriksen (2006) posited a four-stage model which takes a strategic view, with a great focus on prioritising the services that touch end users' needs. The stages included are: cultivation which requires vertical and horizontal integration across government, an extension that offers Web user interfaces for citizens' interaction, maturity which provides a mechanism for processing users' requests, and the revolution stage in which data are shared across government and application requests can be traced online.

By reviewing 12 stage models, Lee (2010) developed a model that defines five stages, which are: presenting, assimilating, reforming, morphing and e-Governance. The presenting stage offers a simple presentation of information on the Web. The assimilation stage offers interaction-based services online. In the reforming stage government services become automated and used via the Web (i.e., transaction-based). The morphing stage addresses the implication of changes inside government due to service automation and delivery. Finally, e-Governance stage implies that citizens can be engaged in the political decision-making process.

Further, a couple of other stage models (e.g., Renteria et al., 2019; Scholta et al., 2019) have recently emerged down the line. The following paragraphs offer a brief review of these two models.

By reviewing 27 stage models published between 2000 and 2012 using qualitative analysis, Renteria et al. (2019) developed the Enabler-Based Digital Government Maturity Framework (EDGMF). This model uses a set of dimensions, rather than stages, which reflect the key government functions that must be transformed to improve the maturity level. For each, the researchers define the dimension and its key theories of change. These dimensions are: (1) leadership, (2) regulatory regime, (3) strategy, (4) organisation, (5) governance, (6) technology, and (7) data. The authors suggest that each dimension can be decomposed into a variety of sub-dimensions.

Along the same lines and based on the existing stage models, Scholta et al. (2019) suggested a stage model designed for the "no-stop shop" government. Their model extends the integration stage, in particular, to include three other dimensions, which are the integration of data collection, integration of data storage, and purpose of data

use. This model highlights the need for inter-organisational data integration across government, which is achieved through a single centralised database to overcome the interoperability issues and proactively anticipate citizens' needs, as the authors suggest. Further, Table 2.2 provides a summary of the stage models discussed above.

Model Type	Stages	Common Features	Unique Feature	Model's Author
4-Stage	Cataloguing, transaction, vertical integration, horizontal integration	<ul style="list-style-type: none"> - Information presence about the agency and the provided services on the Web. - Stakeholders can perform online electronic transactions. - Local, state and federal government levels are connected together across services in the same and different levels. 	- regarded as baseline reference model.	(Layne & Lee, 2001)
	Cultivation, extension, maturity, revolution		<ul style="list-style-type: none"> - Government-stakeholder interaction facility. - Online tracing of stakeholder applications and transactions. 	(Andersen & Henriksen, 2006)
5-Stage	Dissemination, interaction, transaction, integration, participation,	<ul style="list-style-type: none"> - Information presence about the agency and the provided services on the Web. - Government-stakeholder interaction facility. - Stakeholders can perform online electronic transactions. - Local, state and federal government levels are connected across services in the same and different levels. - Citizens can be engaged in the political decision-making process. 		(Moon, 2002)
	Presenting, assimilating, reforming, morphing, e-Governance		<ul style="list-style-type: none"> - Implication of the changes on government is addressed. 	(Lee, 2010)
6 (and over)-Stage	Cataloguing, Interaction, transaction, integration of data collection, integration of data storage, purpose of data use		<ul style="list-style-type: none"> - Designed for no-stop rather than one-stop shop government. - Focus on inter-organisational data integration across government through creation of a single centralised database to overcome the interoperability issues. 	(Scholta et al., 2019)

			- Proactive anticipation of citizen's needs.	
	Leadership, regulatory regime, strategy, organisation, governance, technology, data		- Addresses the key government functions that must be transformed to improve the maturity level. - Addresses the implication of the changes.	(Renteria et al., 2019)

Table 2.2: Summary of e-Government Implementation Stage Models

Along with the potential benefits of stage models and the insight they offer into the changes happening in organisations, they tell little about the effects, implications, and attributes of these changes (Nograšek & Vintar, 2014). They have, however, been criticised for various drawbacks, for example, lack of governance perspective and change mechanism (Scholta et al., 2019), failure to address implementation barriers in practice (Coursey & Norris, 2008), lack of attention to context (Wirtz & Daiser, 2018), being weakly grounded in theory or empirical evidence (Coursey & Norris, 2008; Renteria et al., 2019), oversimplification of reality, linear thinking, and paying little attention to the organisational structures and processes (Renteria et al., 2019).

Conversely, Iannacci et al. (2019) argued that stage models are grounded in process theory. They accentuate that the current models instantiate a general theory of process revolving around a linear sequential evolutionary approach. However, the researchers argue that the assumptions of linear and irreversible change coupled with the idea of control (i.e., goal formulation and smooth implementation) are too unrealistic.

Moreover, Scholta et al.'s (2019) model raises many issues, such as that it might be overwhelming to create a single/central database for the whole government, especially if the government has various levels of structures (e.g., local, state and federal). According to Yang et al. (2014), both centralised and decentralised levels of information sharing need to be recruited, arguing that centralised types of information can bring advantages but might not well materialise to individual and agency needs, and could further constrain innovations. Another concern is that data standardisation might not be easily achieved, considering information systems heterogeneity and incompatibility. Data centralisation also raises issues of security and privacy across

government jurisdictional departments, not to mention the diverse goals and interests, and political conflicts among various e-Government stakeholders. Furthermore, implementing a no-stop shop, as such, needs fundamentally a highly reliable partnership between people and government, which should be backed by accountability and well-articulated information policy.

In the context of developing countries, Yildiz (2007) argued that developing countries may not necessarily follow the step-wise order of government development as suggested by stage models. He indicated that these countries could develop all the stages almost simultaneously as they may mimic the advanced countries and learn from their experience of success and failure. This argument is supported by Iannacci et al. (2019) who asserted that stage models are based on process theory by which the sequence of the stages may be skipped, even though it is necessary for the outcome of interest.

Given this theoretical perspective and gaps in the existing stage models discussed, this research, therefore, proposes that there is a need for a new approach that can address these gaps and explicate the complexities and implications regarding e-Government implementation. To this end, a review of the challenges facing e-Government implementation is offered next.

2.3.2. e-Government Implementation Challenges

According to Sun et al. (2015), the most critical challenges facing e-Government implementation and use, in practice, are those related to IT illiteracy and the digital divide; sustainability and economic challenges; trust, privacy and security; digitisation and document management; marketing and awareness; legislation and policy issues; transparency and accessibility; content management; infrastructure readiness; and integration and interoperability.

Researchers point out that government organisation programmes become increasingly interrelated, and in many cases, organisations must collaboratively work together to share knowledge and integrate information to be able to solve complex problems of common interests (Dawes, Cresswell, & Pardo, 2009; Pardo & Tayi, 2007; Yang et al., 2014). Moreover, for e-Government to attain the objectives sought from its creation, public services must be organised around citizens' and other stakeholders'

needs (Layne & Lee, 2001; Themistocleous, Irani, & Love, 2005). The flow of these services should be seamlessly supported by information systems inside and across respective organisations. However, information systems in organisations have been developed in isolation merely to satisfy specific organisational, or even departmental, needs using heterogeneous and incompatible IT infrastructure and application platforms by which these systems become dispersed and disintegrated (Janssen & Cresswell, 2005; Lam, 2005)

Nevertheless, e-Government cross-organisational integration is a complex socio-technical process that raises many concerns such as information privacy and confidentiality (Gil-Garcia, Pardo, & Burke, 2010; Yang & Wu, 2013, 2014). In addition, integration efforts need to be viewed as projects in their own right, which imposes changes across organisations in both management and operational levels to facilitate information and process flows among public organisations (Gil-Garcia & Pardo, 2005; Gil-Garcia et al., 2010; Groznik & Trkman, 2009; Pardo & Burke, 2008; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Yang et al., 2014). As a result, achieving integration is complex and challenging (Janssen & Cresswell, 2005; Kamal, 2008; Kamal & Themistocleous, 2006; Lam, 2005; Pardo, Cresswell, Dawes, & Burke, 2004). Incompatible information systems infrastructure, high maintenance cost, and misconception of the true purpose of integration are among the challenges that must be overcome to fully attain e-Government benefits (Kamal et al., 2013; Themistocleous et al., 2005). Kamal and Themistocleous (2006), in their empirical investigation of e-Government in LGAs in the UK, reported that the most common problems associated with e-Government integration are: (a) data redundancy and inconsistency, (b) sharing of services and functionality, (c) applications interconnectivity, (d) interdepartmental coordination, (e) citizens data privacy and security, (f) data sharing standards, (g) high operational and maintenance cost of heterogeneous information systems, (h) data integrity and quality, (i) interoperability among the disparate information systems and, (j) lack of uniform citizen-view.

Arguably, many other challenges have been encountered in developing countries, in addition to those described above. The literature has reported multiple challenges in this context, including inadequate IT infrastructure and the digital divide (Heeks, 2003; Nkohkwo & Islam, 2013; Sun et al., 2015; United Nations, 2018, 2020), lack of knowledge and professional skills for development (Al-Moalla & Li, 2010; Gunawong

& Gao, 2017; Heeks, 2003; Nkohkwo & Islam, 2013; Twizeyimana & Andersson, 2019; United Nations, 2018, 2020), lack of strategic planning and change management (Al-Moalla & Li, 2010), laggard economic growth and low productivity (Gunawong & Gao, 2017).

In light of the above challenges, it is obvious that these challenges stem from various perspectives such as social, political, legal, economic, organisational, institutional, cultural, technical as well as knowledge-related. Addressing such challenges calls for further multidisciplinary studies of investigation using different perspectives and theoretical lenses. Table 2.3 provides a summary of e-Government challenges.

Having reviewed and appraised models of e-Government implementation and discussed the implementation challenges, the question is why there is still a high failure rate in the implementation of e-Government projects is yet to be properly answered. Yet, there is a lack of adequate implementation models that incorporate social aspects along with technology adoption and the examination of the complex interplay between technical and social factors. There is a need for more rigorous studies that offer new holistic approaches using different theoretical lenses (e.g., STS theory). To contribute to mitigating the risk of e-Government projects failure, this research suggests that a socio-technical approach is necessary to understand the complex inter-winding relationships of the socio-technical factors influencing e-Government implementation. In doing so, a review of STSs follows.

Type of Challenge	Examples of the Challenges	Reference
Technical	- Digital divide	(Heeks, 2003; Nkohkwo & Islam, 2013; Sun et al., 2015; United Nations, 2018, 2020)
	- Privacy and security	(Gil-Garcia et al., 2010; Sun et al., 2015; Yang & Wu, 2014; Yang & Wu, 2013)
	- Digitisation, content and document management	(Sun et al., 2015)
	- Transparency and accessibility	(Sun et al., 2015)
	- Infrastructure readiness	(Heeks, 2003; Janssen & Cresswell, 2005; Lam, 2005; Nkohkwo & Islam, 2013; Sun et al., 2015; United Nations, 2018, 2020)
	- Integration and interoperability	(Gil-Garcia, 2012; Lam, 2005; Layne & Lee, 2001; Pardo et al., 2004; Sun et al., 2015; Yang & Maxwell, 2011)

Organisational and Legal	- Inter-organisational/departmental coordination - Business process	(Kamal & Themistocleous, 2006)
Social	- Trust	(Sun et al., 2015)
	- Attitudes and perceptions	(Brown & Brudney, 2003; Yildiz, 2007)
Economic	- High cost	(Heeks & Bailur, 2007; Kamal & Themistocleous, 2006)
	- Laggard economic growth - Low productivity	(Gunawong & Gao, 2017)
Political	- Decision-making and agenda setting	(Al-Moalla & Li, 2010; Yildiz, 2007)
Knowledge and Cultural	- IT illiteracy	(Gunawong & Gao, 2017; Heeks, 2003; Nkohkwo & Islam, 2013; Sun et al., 2015; United Nations, 2018, 2020)
	- Marketing and awareness	(Sun et al., 2015)
	- Lack of skills	(Al-Moalla & Li, 2010; Gil-Garcia & Pardo, 2005; Gunawong & Gao, 2017; Heeks, 2003; Nkohkwo & Islam, 2013; Twizeyimana & Andersson, 2019; United Nations, 2018, 2020)

Table 2.3: Summary of e-Government Implementation Challenges

2.4. Socio-Technical Systems

Taking theoretical stances is critical to bridge the gap between research and practice (Kromidha & Cordoba-Pachon, 2014). Further, the use of theoretical lenses offers guidance on how to understand the phenomenon under investigation. More specifically in the context of this research, looking from a theoretical angle would provide a more comprehensive view of the emergent issues regarding e-Government implementation. Theories also predict future trends and provide a foundation for interference and action (Gregor, 2006). Yet, researchers in studying e-Government implementation have used diverse theories to support their underlying propositions. Meanwhile, Iannacci et al. (2019) argue that a unifying theory of e-Government implementation is missing in the e-Government literature. Nevertheless, given the context of the multi-disciplinary nature of this research, this study sheds light on STS theory, which is the focal theory of this research. Before getting into the details of STS theory, this section describes the concept of ‘socio-technical’, its origin and its implications for the creation of STS theory.

The concept of 'socio-technical' was found by the London Tavistock Institute (LTI) research centre. LTI was established in 1946 for the introduction of coal mining machinery (Davis et al., 2014; Eason, 2007, 2008, 2014; Khan et al., 2011; Mumford, 2006; Whitworth, 2011). At the time, the industry's production demands encountered local communities' social needs (Damodaran et al., 2005; Eason, 2008; Khan, Moon, Park, Swar, & Rho, 2011; Trist, 1981; Whitworth, 2011). The introduction of machinery without analysing the associated impacts in working procedures addressed the need to consider the behavioural issues when designing and implementing new technologies.

A socio-technical system (STS) – sometimes referred to as a socio-technical work system – “is a particular expression of sociotechnical theory” (Walker, Stanton, Salmon, & Jenkins, 2008, p. 480). It consists of two interacting sub-systems, social and technical, that are jointly autonomous but correlated (Bostrom & Heinen, 1977b; Khan et al., 2011; Nadin, Waterson, & Parker, 2001; Whitworth, 2011). According to general systems theory (Bertalanffy, 1968), a 'system' is defined as a structure of autonomous parts that mutually interact to form an equally autonomous whole. System formation also implies complex feedback and feedforward interactions among its parts (Whitworth, 2011). The social sub-system concerns people's characteristics (e.g., attitudes, abilities, values), people's relationships, reward policies, and structures of authority (Bostrom & Heinen, 1977b; Khan et al., 2011). The technical sub-system deals with the processes, tasks and technology required to transfer inputs into outputs, where the outcome of the work system is the result of joint interactions of these two sub-systems (Bostrom & Heinen, 1977b; Khan et al., 2011). Therefore, any initiative of intervention, design or redesign of a work system must synergise the two sub-systems and analyse the relationships between them, and between them and the external environment that affects or is affected by the work system (Bostrom & Heinen, 1977b). Some scholars later amended the boundaries of STS to include clients, vendors, and rules and regulations governing the organisation's associations with society (Khan et al., 2011).

Davis et al. (2014) argued that STS thinking has broad applicability to address important challenges facing people in their daily lives. STS principles have helped developers understand how emergent technology can be applied and integrated with existing social/organisational systems and the prospective roles of users (Davis et al.,

2014). Many new systems are often partly used, or only limited functionalities are adopted (Eason, 2008). On many occasions, the technology is needed to get the work done but sometimes the way it works does not match user expectations. As STS is structured in sub-systems, a change in a sub-system affects its constituents and its relationships with other sub-systems and leads to subsequent changes on the other sub-systems (Kompella, 2017).

According to Berg, Aarts, and Lei (2003), most STS aspects emerged in the area of information systems research. They indicate that it has been increasingly recognised that bringing insights from social sciences is of vital importance to the broader contexts of STS and subsequently to the area of information systems. The researchers note that, since information systems require communication with individuals and thus inevitably influence them, a focus on the interrelatedness between technology and its social environment is required to understand information systems, thereby assisting in improving their efficiency. Such interrelatedness provides a key insight into how technology is developed, implemented, diffused and adopted (Shin et al., 2009). Berg et al. (2003) assert that the interrelation of social and technical aspects can be presented in many ways in which it might not be possible to capture in a simple model or theory.

The STS concept is also rooted in other areas such as computer supported cooperative work (CSCW) in which social researchers and computer scientists work together to develop instruments that support group decision-making, collaborative writing, virtual conferences, and so on (Schmidt, 2011).

To this end, IT systems affect the environments in which they operate in many distinct ways, and deeper than is usually anticipated (Orlikowski, Walsham, & Jones, 1996). This could determine, to a large extent, the success or failure of the system in use, creating new ways of interactions that inevitably influence the relations among those who communicate and shape the future development of technology (Berg et al., 2003). In light of this, technology development must be viewed as a socio-technical process rather than solely technical. The evolution of the STS concept has led to the emergence of STS theory as described in the next sub-section.

2.4.1. Socio-Technical Systems Theory

Socio-Technical Systems¹ Theory was first presented as part of the STS research conducted in LTI (Davis et al., 2014; Eason, 2007). The researchers who proposed STS theory believed that it was a revolution in organisational design that fosters job satisfaction (Eason, 2008). The theory suggests addressing both technical and social factors when planning an organisational change, whether it involves implementing new technology or managing a business change programme (Cherns, 1976).

According to Eason (2008), STS theory provides insights that help to understand how an organisation effectively carries out its functions and offers tools for designing and implementing new work systems. He states that the theory has the potential to explain the complexity of people collaborating at work and how they use different tools and technologies to carry out their work collectively.

Davis et al. (2014) note that the success of STS theory can partly be credited to the ongoing development of STS of thinking and practice. Meanwhile, Eason (2008) asserts that STS theory remains relevant in practice, and its increasing recognition and acceptance have been acknowledged by spectators beyond the social sciences (e.g., the IT community).

STS theory has been developed and applied globally both by scholars and professionals (Davis et al., 2014; Eason, 2008). It is broadly acknowledged as the key to the successful implementation of information systems (Bostrom & Heinen, 1977b) and organisational change (Nograšek & Vintar, 2014). As Eason (2014, p. 213) puts it: “Of all the systems approaches that are available I have found sociotechnical systems theory the most powerful way of explaining systems behaviour and the most useful in designing new systems”.

Moreover, the theory is significantly important in analysing the gaps of implications when attempting to introduce a new technical solution on an existing STS (Eason, 2008, 2014). It aims to create an ideal organisational design that allows three organisational system components, the social sub-system, the technical sub-system and the environment, to interact and work together (Pasmore, as cited in Shin et al.,

¹ Socio-Technical Systems (STS) Theory is on some occasions referred to as Socio-Technical Theory; but since this research deals with e-Government systems, the term ‘Socio-Technical Systems Theory’ is used hereinafter in this particular research.

2009). Albert Rice, and Eric Trist and his colleagues, were among the first few scholars who applied STS theory. Trist et al. (as cited in Davis et al., 2014; Eason, 2007, 2008, 2014) assessed the introduction of coal cutting machinery, of longwall coal mining, and its influence on the work roles and team organisation of miners. Similarly, Rice (as cited in Eason, 2007) studied the introduction of mechanically operated looms in Ahmedabad weaving sheds in India and the resulting fragmentation of work roles.

Researchers like Bostrom and Heinen (1977b), Davis et al. (2014), Eason (2014), and Mumford (2006), have called to expand STS conceptualisation and apply the core principles to new research areas, outreaching the typical focus on new technology and organisations. They argue that applying socio-technical thinking to new fields of study can help investigate modern critical issues, and further expand the social effect and breadth, while simultaneously giving rise to progressive theoretical development. As a result, key concepts and applications of STS theory have evolved over time to respond to the changing nature of work. This has broadened its application to cover advanced manufacturing technologies through to office-based operations (e.g., management information systems) while embracing the common theme of technology intervention. In particular, its application in large-scale IT projects offered useful and rich socio-technical guidance to researchers. For instance, STS theory was applied in the investigation of two large-scale IT projects from the UK public sector, which are ‘the National Health Service (NHS) National Programme for Information Technology (NPfIT)’ (Clegg & Shepherd, 2007; Eason, 2007) and ‘the IT system supporting the delivery of social care services’ (White, Wastell, Broadhurst, & Hall, 2010). STS theory enabled these researchers to reflect on its insights and offer critical analysis and constructive advice on the socio-technical design of the systems under study (Davis et al., 2014).

Besides influencing new technology designs, the theory has significantly influenced social elements of organisational design, specifically job (re)design and new ways of work organisation (Davis et al., 2014; Shin et al., 2009), such as autonomous workgroups, multi-skilling, and user control. STS theory has guided organisations to set forth effective work systems and improved staff expertise, which resulted in higher productivity, motivation, and life wellbeing (Davis et al., 2014).

Various applications of STS theory have emerged in the literature to delineate the use of the theory or its principles in a whole or part. Such applications took different terms as described in the following sub-section.

2.4.2. Socio-Technical Approaches and Designs

As indicated above, the various applications of STS theory resulted in new socio-technical concepts, including socio-technical approach, socio-technical design, and socio-technical perspective. While the first two are described respectively below, the third one could be any use of the STS concept.

The term 'social-technical approach' stems from several origins (Berg et al., 2003). For instance, when researching information systems design, Edin Mumford and his colleagues introduced the socio-technical approach over 40 years ago in LTI. The team had been working toward embedding social elements in information systems development, such as workers' skills, job satisfaction and networking, side-by-side with technical elements (Mumford & Weir, as cited in Berg et al., 2003). The Tavistock pioneers believed that their research projects should not only be attempts to increase knowledge, but that they should also have embraced the improvement of work situations which were, at the time, unsatisfactory in human terms. This team's effort led to the development of an approach or methodology which they termed 'Socio-Technical Approach'. The purpose of socio-technical approaches is to increase the knowledge of the development of new information systems or innovative technologies, and how they could be embraced into social activities, with the desire to improve the technical system (Berg et al., 2003).

Socio-technical approaches follow an adaptive, incremental change to practice (Berg et al., 2003). They have mainly been used to study the integration of technology, processes, people and organisational structure (Shin et al., 2009). Given its integrative and holistic essence, the socio-technical approach provides a powerful framework, stronger than any other framework, for the investigation of complex interrelationships between technical and social aspects, as the framework takes thoughtful account of the technological and social particularities of IT (Sawyer, Allen, & Lee, 2003; Shin et al., 2009). It implies finding harmonisation between the specific contextuality of the work being done and the technical features of the IT solution, where the interaction between them should be designed from the perspective of the user, who interacts with

the technology, and the processes in which technology gets embedded (Berg et al., 2003).

On the other hand, socio-technical design is a model (or a view) that is created using the principles of a socio-technical approach. It was first introduced after World War II to exploit human intelligence and skills, associating them with new technologies that would transform how people live and work (Mumford, 2006). According to Bostrom and Heinen (1977b), socio-technical design is set to target dual improvement in the workplace. The first is improvement in the performance of the work output, while the second is improvement in the quality of the work life (QWL) of the individuals performing the tasks within the work system (Bostrom & Heinen, 1977b). QWL is defined as the career that offers an interesting, challenging, and responsible profession as perceived by the workers (Bostrom & Heinen, 1977b).

In the context of information systems, socio-technical design defines a process and set of human needs linked to technology and change (Bostrom & Heinen, 1977b). It can be used to contribute to most problem-solving in work scenarios, should both the designers and recipients have the desire to use a democratic practice (Mumford, 2006).

Practically, a key objective of socio-technical design is to guarantee that technical and human factors have been given equal weight in the design process wherever feasible (Bostrom & Heinen, 1977a; Mumford, 2006). The socio-technical design also provides a crucial democratic element to workers who use new technologies by which they are engaged in determining the desirable quality improvements of work life changes (Mumford, 2006).

Cherns (1976) describes nine principles for socio-technical design. They can be summarised as: (1) the design process must be compatible with its objectives; (2) only minimum specifications are essential; (3) variances (i.e., deviations from expected norms and standards) must be eliminated or controlled as close to their point of origin as possible; (4) work groups should possess a variety of skills in order to be able to respond flexibly to any change; (5) knowledge and experience should be shared, and work activities passed across group boundaries from one group to another, should a new set of activities or skills be required; (6) information must go first to the place where it is needed for action; (7) systems for social support must be set to reinforce the desired social behaviour; (8) a high quality of work must be maintained (i.e., a

challenging job that is demanding, inspires continued learning and self-development, relates work to social life and leads to a desirable future); and finally, (9) the recognition that design is an adaptive process and never becomes complete. Most importantly, any team member must be regarded as complementary, not subordinate, to technology (Mumford, 2006).

The two most fundamental values of socio-technical design are: first, its contribution to workers' social needs where individual rights must be preserved and constantly given a high priority, and second, its democratic and participatory nature where individuals, even if of lower groups in the hierarchy, are engaged in the decision-making process and their voices are heard and listened to (Mumford, 2006; Nadin et al., 2001). Users' involvement in the system design process is critical to maintaining compatibility between process and outcome (Cherns, 1976; Clegg, 2000). As a new system directly affects end users' jobs and roles, their engagement in the system development process should start from the outset, including design and implementation, and the operational stages (Nadin et al., 2001). As Mumford (2006) put it: "The world of socio-technical design is democratic, humanistic and provides both freedom and knowledge to those who are part of it" (p. 339). Nadin et al. (2001), however, identified some potential contrary issues of involvement, particularly if the process is not managed properly. The authors warned that intensive engagement of users may overwhelm their expectation, which in some cases result in conflicts and resistance to the change if some of the suggested ideas are rejected or fail to get implemented.

Socio-technical approaches and designs have been adopted in many application domains, specifically in an organisational context. For instance, in information systems (e.g., Bostrom & Heinen, 1977a, 1977b), digital multimedia broadcasting (e.g., Shin et al. 2009), health informatics (e.g., Berg et al., 2003), environmental sustainability (e.g., Davis et al., 2014) and e-Government (e.g., Gibreel & Hong, 2017; Heeks, 2006). Selected samples of these and similar studies will be reviewed in further detail in the following two sub-sections.

2.4.3. Socio-Technical Systems and Organisations

Organisations have been the main unit of analysis, and the context, in socio-technical research studies. Therefore, viewing and understanding organisations from an STS

lens is crucial. Organisations are regarded as open systems that comprise people, tasks and other hard and soft (technological) artefacts, operating in a wider context (an environment) that is influenced by a culture and its values and sets of generally accepted practices constrained by certain regulations (Trist, 1981; Walker et al., 2008). STS theory (discussed above) provides a framework that views an organisation as a complex socio-technical system comprising two interrelated sub-systems, social and technical. The technical sub-system is concerned with processes and technical artefacts of the organisation (Bostrom et al., 2009; Bostrom & Heinen, 1977b; Pardo et al., 2004). On the other hand, the social sub-system is concerned with people's attitudes, values and behaviours, knowledge, skills, and needs they bring to the work environment, as well as the reward system and authority structures that exist in the organisation (Bostrom et al., 2009; Bostrom & Heinen, 1977b; Pardo et al., 2004).

The work of an organisation is accomplished by a set of activities that involve joint interactions between the two sub-systems (Bostrom & Heinen, 1977a; Pardo et al., 2004; Walker et al., 2008). The output produced is a result of these interactions (Bostrom & Heinen, 1977a). Trist (1981) suggested that the outcome of this interaction is either economic performance or job satisfaction. According to Bostrom et al. (2009, p. 18), "Socio-technical system theory argues that desired results can only be achieved if the interdependency of these subsystems is explicitly recognised and addressed". Similarly, Nograšek and Vintar (2014) argued that no public organisation can be transformed by technology alone while neglecting social issues such as lack of managerial support, rigid structures, and resistance to change.

According to Bostrom and Heinen (1977a), it is not unusual that practitioners, in the workplace, tend to deliberately embrace the technical system as is and then manage to adapt the social system to it. They note that such an approach is of little effect because it overlooks some of the important elements of the work system, such as organisational behaviour aspects. They stress that information systems will continue to fail and run at increasing cost unless specific actions are taken to understand and control organisational behavioural problems. Eason (2008) and Khan et al. (2011) argued with this view, relating the high failure rate of information systems to the domination of technological focus rather than considering IT solutions as STSs operating in organisational and social environments. The narrow focus on specific modification aspects in the process and technology variables prevents systems designers from

figuring out that these modifications cause subsequent changes (i.e., implications) to other work system variables. These implications are known as ‘secondary effects’ or ‘secondary changes’ as they are not given primary consideration in the design of the original system (Bostrom & Heinen, 1977a). Bostrom and Heinen (1977a) indicated that organisational design approaches that deal with partial organisational life are ineffective as they fail to reflect the holistic view of the work system. They suggested a need for a more realistic metaphor of organisations embedded in a solid design methodology that can integrate various interventions into effective change agendas. “The STS approach argues that any design/redesign of a work system must deal jointly with the social and technical system” (Bostrom & Heinen, 1977a, p. 30). Therefore, it is important to acknowledge the strong association between technical and social elements in organisations during information systems implementation to reflect the holistic view of the enterprise in the work system design. “We believe that the utilization of the STS approach will solve many of the problems facing MIS and substantially reduce the number of MIS failures” (Bostrom & Heinen, 1977a, p. 17).

The concept of STS has been applied in a number of application domains within the organisation context, as noted above (Table 2.4 presents a summary of some STS studies in an organisation context). For example, in the field of information systems and technology implementation, Bostrom and Heinen (1977a, 1977b) posited a socio-technical design model of social and technical system factors and their interrelatedness. Those were people, structure, technology, and tasks. The researchers accompanied their model by practical steps that could be followed in applying an STS approach to information systems implementation. The researchers examined their approach by using a case study example of an online computer registration terminal introduced for redesigning a work system used by a large newspaper in the USA. They concluded that the behavioural problems encountered in the organisation under study were the result of inadequate design, due to which information systems designers viewed the work system as a purely technical system.

Another study on the topic was conducted by Nadin et al. (2001). These researchers investigated the use of a socio-technical participatory method to redesign a group of jobs and tasks in a photographic manufacturing company in the North of England, before the introduction of a new technology. The findings of the study deduced that historical and contextual elements of the organisation need to be thoughtfully

examined to determine the appropriateness of participation in the job design process as a whole, and more specifically, the precise form that participation will take. In practice, nevertheless, organisations are influenced by various political and economic forces which could be beyond decision-makers' intent. Such forces may prevent any intended redesign of jobs and technology (Orlikowski, 1992) which were suggested by Nadin et al.'s (2001) study.

Along the same lines, Eason (2007) examined the implementation of large-scale pre-defined technical information systems across National Health Service (NHS) organisations in the UK, in which local organisations have attempted to adopt and adapt the technical systems to their local contexts. The study concluded that there were many aspects of the technical systems and the design approach adopted that limited the opportunities for local work staff to exploit the benefits of the new technical systems. However, Currie (2012) identified that large-scale technology change studies, such as Eason (2007), lack consideration of the historical factor that creates or prevents large-scale change, since they often only consider case-based examples in specific organisational settings.

In digital media broadcasting (DMB), Shin et al. (2009) investigated the development of a Korean DMB initiative by tracing the interaction between social and technological entities from various perspectives at various developmental stages. A socio-technical perspective was used to examine the dynamic interactions between society's complex infrastructures and the behaviour of organisations. Their findings indicated that such interactions had greatly nurtured the development of Korean DMB. In doing that, Shin et al.'s (2009) focus was merely on a few factors, which were primarily the DMB stakeholders.

In the context of inter-organisational information integration (III), Pardo et al. (2004) posited a conceptual model of the social and technical processes of III. The study aimed to improve the understanding of information system development of inter-organisational collaboration and provide insights into the complexity of III and the nature of the interactions among embedded social and technical processes. Although Pardo et al.'s (2004) model has not been empirically validated, it opened the pathway to other III research to flourish.

Regarding environmental sustainability, Davis et al. (2014) applied an STS perspective approach to the management of crowd events. By extending Leavitt's (1965) framework, which focuses on the interrelationships between people, tasks, structures and technologies, the researchers developed their own framework, which further included external factors of a regulatory framework, customers, and the economic/financial environment. The researchers contended that the potential contribution of their approach was to provide a structured and systematic way of analysing a variety of complex systems, problems, and events. Davis et al.'s (2014) framework can be applied extensively to a range of domains and problems.

In the same vein, Mumford (2006) performed a historical review of socio-technical design, its set of principles and its role in the implementation of computer systems and its impact worldwide. Mumford contended that although socio-technical design embraces democracy and human values and provides both freedom and knowledge to those who are a part of it, it has not yet been accepted as a general policy everywhere. Moreover, the author warned that a lack of fundamental socio-technical values in many organisations could lead to severe industrial conflicts in the future.

Author	Domain/Context	Key Factors	Findings/Implications
Bostrom and Heinen (1977a, 1977b)	IS/Organisation	Technology, tasks, people, structure.	Behavioural problems, encountered in organisations are the result of inadequate design by which information systems designers view the work system as a purely technical system.
Pardo et al (2004)	IS/Inter-organisational	Organisation, technology, information, resources.	Socio-technical interactions are embedded among social and technical organisational processes.
Mumford (2006)	IS/Organisation	Technology, tasks, people, structure.	STS design principles had not yet been a general policy accepted everywhere.
Eason (2007)	IS/Organisation	Technology, tasks, people, structure.	Ignoring STS design aspects limited the opportunities to exploit the benefits of the new adopted technical systems.
Nadin et al. (2001)	Job design/Organisation	Technology, tasks, people, structure.	Historical and contextual elements of organisation need to be thoughtfully examined in order to determine the appropriateness of

			participation in the job design.
Shin et al. (2009)	Telecomm/Organisation	Technology, society, organisation, policy, structure.	Social-technical interactions foster the development of digital media podcasting.
Davis et al. (2014)	Environmental sustainability/Crowd management	People, tasks, culture, technology, goals, infrastructure.	STS approaches can be extended to a variety of complex systems, problems, and events.

Table 2.4: Summary of the Literature Review of STS Studies in Organisation Context.

To this end, the concepts of e-Government and STS have been reviewed. Likewise, the organisation, which is normally the unit of analysis of e-Government implementation, has been viewed and explained as STS. Yet, part of the objectives of this study is positioning e-Government into the STS arena, which is outlined next.

2.4.4. Application of Socio-Technical Systems Theory to e-Government

e-Government is the subject of this study, which seeks to investigate the implications of socio-technical interactions for e-Government implementation and its success. Accordingly, this sub-section sets out to explain e-Government as STS.

e-Government can be viewed as “a system” of a large stakeholder’s community that is shaped by different forces of political, organisational, social, economic, and technical factors. According to Heeks (2006, p. 1), “eGovernment systems are information systems”. Therefore, e-Government systems can be viewed as a set of information systems working together to fulfil clients’ needs and support public organisations’ internal work. Information systems are collections of hard and soft IT components that accept and process data and produce meaningful information to achieve specific purposes. Information systems also involve human interaction in some stages to accomplish the associated tasks. More precisely, e-Government systems are, in a broad sense, a set of collaborative information systems which accept input data, process transactions, and produce outputs of information to support public decisions (Heeks, 2006). These information systems are embedded in a social environment of factors of organisations, people, policies and regulations, and structures and culture (Dawes, 2009; Heeks, 2006; Kompella, 2017). Such factors act

as forces that affect (and are affected by) e-Government systems. This implies that e-Government systems are STSs (Damodaran et al., 2005; Dawes, 2009; Gibreel & Hong, 2017; Heeks, 2006; Khan, Moon, Park, Swar & Rho, 2011; Kompella, 2017), where the outcome these systems produce is the result of individuals interacting with technology, which is not attainable either by technology alone or by humans operating in isolation (Damodaran et al., 2005).

However, what distinguishes e-Government systems from other STSs is that e-Government systems are set in a broader context, span multiple organisations, and involve wider groups of stakeholders. They are also surrounded by a socio-political environment of regulations, bureaucracy, and political rigidity. “An infrastructure for digital government requires an extended view of enterprise that goes far beyond a single organisation to encompass all the parts of a government as an interconnected whole operating in a complex social and economic environment” (Dawes, 2009, p. 258). In this sense, the development of e-Government systems is difficult and requires significant efforts of socio-technical transformation within people, policies, and participating organisations (Damodaran et al., 2005). This makes e-Government projects challenging and prone to failure (Dawes, 2009). “e-Government is difficult to implement, hard to manage, and often fails” (Heeks, 2006, p. 1).

However, many large-scale technological change projects tend to concentrate exclusively on technology design and implementation rather than developing a holistic composite structure, of which technology is only one dimension (Damodaran et al., 2005). There is a consensus in the literature suggesting that such one-sided focus is a key reason for e-Government failure (e.g., Damodaran et al., 2005; Davis et al., 2014; Heeks, 2006; Luna-Reyes et al., 2005). Most crucially, a socio-technical design to e-Government shall be set up to support the active participation of citizens, users, businesses, and other stakeholders, in order to realise its anticipated benefits (Damodaran et al., 2005).

According to Gibreel and Hong (2017), current literature still lacks a way of understanding how social and technical factors interact to influence e-Government implementation, since e-Government research has concentrated primarily on technology. In this context, several researchers stress the need for incorporating socio-technical approaches in designing and delivering e-Government services (e.g.,

Damodaran et al., 2005; Dawes, 2009; Heeks, 2006). For example, Damodaran et al. (2005, p. 9) state that e-Government service delivery according to the needs of the citizens “requires the development of socio-technical subsystems, combining technology and communication processes which meet the task needs of citizens and the procedural and legal requirements of local government”. Similarly, Heeks (2006) and others (e.g., Cuadrado-Ballesteros et al., 2021; Dawes, 2009) contend that both social and technical aspects must be addressed when managing e-Government, stressing that the failure of e-Government systems is more attributed to improper management of social aspects than matters of technology.

In pursuing the aims of this research, a systematic literature review was performed to explore socio-technical research in e-Government and identify the current literature gap in the application of STS theory to the study of e-Government. This process is described in the next section.

2.5. Key Literature Gaps: A Systematic Literature Review

The literature review conducted above has discussed the various implementation issues and challenges associated with e-Government implementation and identified the need to view e-Government as an STS and rethink the implementation from this lens. Therefore, a systematic literature review was found to be useful for the identification of gaps in this particular area and addressing the research question (Robinson & Goodman, 2011). Thus, the specific purpose of this systematic review is to identify the current literature gap in the application of STS theory to the study of e-Government implementation.

In doing so, the methodological approach suggested by Jesson, Matheson, and Lacey (2011) for conducting a systematic review is followed. This approach includes the key stages of planning, conducting, and reporting the outcomes (Alzahrani, Al-Karaghoul, & Weerakkody, 2017).

2.5.1. Planning the Review

In commencing the review process, a research question must be specified. In this study, the research question is intended to answer:

How has the STS theory been applied, in the extant literature, for addressing e-Government implementation success or failure?

To identify whether this question has already been answered or not, a literature search was conducted on 3 May 2021 using the following search criteria:

- Literature language: *English*;
- Literature published: *between 1990 and 2021*;
- Type of literature: *papers and conference articles*;
- Keywords: *“e-government”, “egovernment”, “electronic government”, “socio-technical theory”, “sociotechnical theory”, “socio-technical system theory”, “sociotechnical system theory”, “socio-technical systems theory”, and “sociotechnical systems theory”*;
- Search query: *(e-government OR egovernment OR "electronic government") AND ("socio-technical theory" OR "sociotechnical theory" OR "socio-technical system theory" OR "sociotechnical system theory" OR "socio-technical systems theory" OR "sociotechnical systems theory")*;
- Databases searched: *Google Scholar, Springer Link, ScienceDirect, AIS, ACM, SCOPUS, Web of Science, and IEEE Xplore.*

2.5.2. Conducting the Review

The initial search returned 546 articles. However, as the number of articles was very large, a scanning process was performed to select the most relevant articles, excluding those that did not meet the search criteria; for example, textbooks and those which did not contain the combination of “e-Government” and “socio-technical systems theory” keywords, and their variants, in the title or abstract. Studies that are not based on STS theory and do not contain a relevant discussion of the theory or adopt an STS model were also excluded. Therefore, the final list ended up with 13 closely related articles, of which ten came from these journals: *Business Systems Research, Government Information Quarterly, Journal of Information Science, Journal of Public Administration Research and Theory, Journal of the Association for Information Systems, Sustainability, Technological Forecasting and Social Change, Telecommunications Policy, and The Electronic Journal of e-Government*. In addition, three conference proceedings were also found relevant. These articles are from *the*

2.5.3. Review Outcome

The review revealed that there were very few studies applied the STS theory lens to the field of e-Government. Nevertheless, shedding light on those relevant studies brings useful insights to our understanding of the phenomenon under investigation.

Table 2.5 summarises the findings collected from this review.

Author	Domain/Context	Key Factors	Findings/Implications
Damodaran et al. (2005)	e-Government/ LGAs, UK	Technology, business process, working practices, public participation.	e-Government implementation, under study, did not embrace the principles of widening democracy and increasing social inclusion.
Olphert and Damodaran (2007)	e-Government/ UK Government	Technology, business process, working practices, public participation.	Low involvement of citizens in e-Government development, and goals of achieving democracy were elusive.
Welch and Pandey (2008)	e-Government (Intranet)/ US state government agencies	Intranet information quality, organisational reliance on intranet, red tape.	Intranet reliance reduced red tape, but red tape did not affect intranet reliance or information quality, also intranet information quality and intranet reliance positively affect each other.
Dawes (2009)	e-Government/ Conceptual research	Society, government, humans, technology, information.	Future e-Government systems must consider values and policies, human, organisational, institutional, and societal factors in addition to foundational tools and technologies.
Soumia et al. (2011)	e-Government/ Conceptual research	Technology agility, process agility, people agility, structure agility.	The proposed framework allows decision-makers to examine and compare different systems at different agility levels.
Nograšek and Vintar (2011)	e-Government/ Conceptual research	People, process, technology, structure, culture.	ICT change-driven depends upon the willingness of the organisational element.
Nograšek and Vintar (2014)	e-Government/ Conceptual research	People, process, technology, structure, culture.	The conceptual model highlighted the role of ICT in the e-Government and its effect on other organisational attributes.

Yang and Wu (2016)	e-Government/ Public organisations in Taiwan	Policy, media, public, government.	The factors of facilitating conditions, organisational capability, perceived usefulness, external influence and organisational culture had a positive effect on government's intention to publish open data. Conversely, perceived risks had a negative impact.
Kompella (2017)	e-Government/ Public sector, India	Technology, organisation.	e-Government systems adoptions had been dominated by technology-deterministic approaches among other approaches.
Gibreel and Hong (2017)	e-Government/ Panel dataset of 200 countries	People, organisation, technology.	e-Government development should be looked at using a holistic approach rather than an atomistic single-cause approach.
Zhang et al. (2018)	e-Government/ China	Technical system, social system, legal frameworks, IT vendors, user behaviour.	Cybersecurity law had impacted the parameters of e-Government system, and also imposed new changes to procurement practices and users' behaviours.
Bakunzibake et al. (2019)	e-Government/ Rwanda	People, process, technology, structure, environment.	There is a misfit between the technical and social systems of organisations implementing e-Government.
Tangi et al. (2020)	e-Government/ Dutch public administrations	Organisational transformation, structural barriers, cultural barriers, internal drivers, external drivers.	Process, people and IS are the most impacted by the transformation, while organisational culture and structure are less affected. External drivers (e.g., external pressure) are the main motivation for organisational transformation.

Table 2.5: Summary of the Systematic Literature Review of STS Studies in e-Government Context.

In this respect, using a sample of local government authorities (LGAs) engaged in implementing e-Government in the UK, Damodaran et al. (2005) inspected the extent to which the e-Government in the UK was being developed as an STS. The findings of the researchers suggested that the e-Government implementation under study did not embrace the principles of widening democracy and increasing social inclusion. For better stakeholders' engagement and effective development of e-Government, the

researchers posited an STS theory-based framework of four nested components that require concurrent alignment and configuration. These components are technology, business process, working practices and public participation.

In a similar study, based on Enid Mumford's socio-technical and participative approach, Olphert and Damodaran (2007) developed a framework to examine citizens' participation in decision- and policy-making in e-Government using a sample of published case studies from the UK. The authors maintained that there is scarce evidence of any significant involvement of citizens in e-government development. They further argued that the evidence of achieving the goals of enhanced democracy, increased social inclusion, and faster adoption of technology had been elusive. They highlighted that the key to the successful development of e-Government systems is to provide citizens with the necessary skills and capabilities to engage effectively in the development process.

However, the focus of Damodaran et al. (2005) and Olphert and Damodaran (2007) was on the citizens' end of engagement to understand their needs, whereas the studies did not incorporate other stakeholders within the socio-technical environment.

Welch and Pandey (2008) proposed an STS model for examining the interactive effects between bureaucratic red tape (i.e., administrative rules and procedures) and the usage of an intranet using a national sample of state government agencies in the US. The authors used the variables of the quality of information on the intranet and the level of organisational reliance on the intranet. Their findings showed that intranet reliance reduces red tape, but that red tape does not affect intranet reliance or information quality. Moreover, their study result indicated that intranet information quality and intranet reliance positively affect each other. In conclusion, the result of their study implied that innovativeness is negatively associated with red tape.

Another study in this realm was presented by Dawes (2009). A holistic conceptual framework was proposed for anticipating future e-Government development, drawn from a stakeholder-driven investigation into potential scenarios of society and government. The framework reflects a dynamic STS encompassing interactions among societal trends, human elements, changing technology, information management, interaction and complexity, and the purpose and role of government. The implication of this study suggested that future e-Government systems must

consider values and policies, human, organisational, institutional, and societal factors in addition to foundational tools and technologies. Nevertheless, as the author pointed out, it was not clear to what extent the collected data were representative of various stakeholder groups. Accordingly, the study was treated as a first exploratory look at the opinions of the stakeholders' community, but not as a definitive study.

Soumia et al. (2011) proposed a socio-technical framework for the evaluation of e-Government IS agility by using the agility of four components: technology agility, process agility, people agility, and structure agility. The researchers posited that the framework allows decision-makers to examine and compare different systems at different agility levels, although the framework has not been tested with empirical data.

Nograšek and Vintar (2011) developed a theoretical integrative model based on a combination of technological determinism theory and STS theory to explain the relationship between ICT and other organisational elements in e-Government through the adaptation of Leavitt's (1965) diamond. Their results showed that while ICT on the one hand holds the potential for a radical transformation of public sector organisations, on the other hand, the utilisation of ICT potential is more than ever dependent upon the willingness of other organisational elements to accept it. However, Nograšek and Vintar (2011) did not incorporate external factors such as political, legal and financial, which the authors believed also affect organisational transformation, particularly in e-Government.

Nograšek and Vintar (2014) examined the interdependence of e-Government development and organisational transformation in the public sector to explain ICT's role as a driving force of organisational transformation. In doing so, the researchers established a theoretical socio-technical model that describes the depth and nature of organisational transformation and specifies the key attributes of the organisational change levels (i.e., workplace level, organisational level, and inter-organisational level). The model still requires further theoretical elaboration and extensive empirical evaluation.

Along the same lines, Yang and Wu (2016) tested the influence of socio-technical factors including legislation and policy, and external pressure factors, such as media and the public, on government agencies' intention and behaviour to publish open

government data. The study used a survey method through questioning government officials from Taiwan responsible for implementing open government data. The study concluded that the factors of facilitating conditions, organisational capability, perceived usefulness, external influence, and organisational culture had a positive effect on the government's intention to publish open data. Conversely, perceived risks had a negative impact. Yang and Wu's (2016) research was conducted in the early development stage of an open government data initiative in Taiwan, so at later stages of open data implementation, the influence of such factors on the government agencies' intention could change.

Likewise, Gibreel and Hong (2017) used a panel dataset of 200 countries, gathered from the World Bank, International Telecommunication Union (ITU) and United Nations, to examine the external socio-technical factors preventing e-Government development in these countries. The research findings highlighted the need to look at the development of e-Government through a more holistic approach rather than an atomistic single-cause approach. Gibreel and Hong's (2017) study focused mainly on the infrastructure-related factors at country levels, while factors at organisational and inter-organisational levels were not considered.

Moreover, in the developing countries context, Kompella (2017) proposed an integrated framework, based on the multi-level perspective (MLP) approach to the evolution of e-Governance systems, to analyse the interplay of socio-technical transitions in e-Governance developments using multiple case studies from India. The author, from the selected cases, noted the dominance of technology deterministic adoption over other approaches.

Zhang et al. (2018) used an STS analysis framework to examine the potential impact of the 2016 Cybersecurity Law on e-Government services in China through open-ended interviews with cybersecurity and e-Government experts. The findings of the researchers revealed that the Cybersecurity Law had directly impacted the technical parameters of e-Government systems and imposed new operational requirements on the social system. On the other hand, it had indirectly mandated changes to government technology procurement practices and imposed new behavioural regulations on users.

Taking a socio-technical perspective, Bakunzibake et al. (2019) explored the extent of changes and effects in the implementation of e-Government initiatives in Rwanda using a study of interviews. The study revealed a misfit between the technical and social systems of the organisations implementing e-Government. The findings also identified other issues like the technology focus of the e-Government projects, poor IT infrastructure, a lack of conducive regulatory frameworks, and improper organisational structure that does not facilitate the change.

Finally, Tangi et al. (2020) developed a socio-technical conceptual model to survey Dutch public administrations to understand the extent to which a technology-driven transformation impacts the social and technical components of the e-Government system, and the extent to which barriers and drivers influence this transformation. Their results showed that factors of process, people and IS are the most impacted by the transformation, while organisational culture and structure are less affected. Moreover, the results suggested that external drivers (e.g., external pressure) are the main motivation for organisational transformation, and that the perceived barriers to transformation can be overcome if there is sufficient external pressure. However, the authors called for further analysis as the research fell short of explaining the correlation between the barriers and the depth of organisational transformation.

2.5.4. Findings and Analysis of the Review

The systematic review indicates that the published articles adopted various theoretical/conceptual models. For example, three of the studies (Nograšek & Vintar, 2014; Nograšek & Vintar, 2011; Tangi et al., 2020) adopted Leavitt's (1965) model which addresses the dimensions of people, process, technology, structure, and culture. Two studies (Bakunzibake et al., 2019; Soumia et al., 2011) adopted Bostrom and Heinen's (1977a) model which includes the dimensions of people, task, technology, and structure. The technology-organisation-environment (TOE) model (Tornatzky & Fleischer, 1990) is adopted by Welch and Pandey (2008). The rest of the studies either used integrative models or developed their own frameworks; however, their frameworks were devised from the same theoretical models mentioned above, using similar key dimensions and factors.

Regarding the use of a theory, all of the approaches were based on the STS theory as a focal theory, while a few also used combinations of other theories, including

technological determinism (Nograšek & Vintar, 2011; Nograšek & Vintar, 2014); Porter's coevolution framework (Kompella, 2017); POIRE framework for the measurement of enterprise IS agility (Soumia et al., 2011); and diffusion of innovation (DOI) theory, technology acceptance model (TAM), and institutional theory (Yang & Wu, 2016).

This points to the conclusion that the extant literature on e-Government implementation has focused on various factors that influence the success and failure of projects. However, the systematic review indicates that there is a gap in the research regarding analysing the interactions of the socio-technical factors. In particular, the ways the social and technical factors interact and affect each other, and the implications of their interactions for e-Government implementation and its success, have not yet been explicitly explained in the literature and validated against empirical evidence. Hence the question asked above has not yet been fully addressed in the literature. Bostrom et al. (2009) argued that anticipated results of the STS (e.g., e-Government) may not be attained unless the interdependency of the social and the technical sub-systems is explicitly recognised and addressed. This signifies that more research should be done to aim at addressing and understanding the implications of socio-technical interactions to contribute towards reducing the risk of e-Government implementation failure. A detailed theoretical context, from which we can holistically understand the relationship between the causes of e-Government success and failure, is required.

2.6. Summary

This chapter has attempted to build a theoretical foundation for the research through critical and systematic review and analyses of the existing relevant literature. It synthesised the existing studies on the concepts of e-Government and its implementation and identified the current issues in e-Government implementation and associated project failures, and the need to view e-Government as a socio-technical system to rethink the implementation from an STS lens. Further, the chapter identified the key gaps in the extant literature and suggested developing a new STS approach that addresses these gaps. The conceptual framework for e-Government implementation is presented in the next chapter.

CHAPTER 3: Conceptual Framework for e-Government Implementation

3.1. Introduction

In the previous chapter, a theoretical foundation for the research was developed through a critical review and analysis of the existing relevant literature. Existing research on the theoretical areas relevant to this study was evaluated and synthesised, and the need to view e-Government as STS and rethink the implementation of e-Government from an STS angle has been proposed.

Based on this theoretical background, this chapter aims to develop an STS conceptual framework for e-Government implementation. It reviews the relevant literature on STS, information systems, public administration, ergonomics, and e-Government areas, particularly to identify the key socio-technical factors affecting e-Government implementation. In doing so, this chapter contains three main sections, including this introduction. Section 3.2 highlights the development of the proposed conceptual framework for this research and discusses, in greater detail, the key sets of factors revealed from the earlier relevant literature thought to influence e-Government implementation. Finally, Section 3.3 provides a summary of the chapter.

3.2. Conceptual Framework

The conceptual framework of this study (as shown in Figure 3.1) represents the key socio-technical factors and their interactions impacting e-Government implementation and its success. The framework is mainly constructed from the prior literature using knowledge gathered from STS theoretical perspectives and other relevant studies, including information systems, public administration, ergonomics, and e-Government. The key role of the framework, in the context of this research, is to represent, organise and categorise the identified factors, as well as to guide the process of the fieldwork.

In doing so, the dimensions of the conceptual framework have been initially devised following Bostrom and Heinen's (1977a) STS model (i.e., people, structure, technology and tasks), which is based on STS theory perspectives. Bostrom and Heinen's (1977a) model has been situated in the organisation context. However, since the domain of analysis in this study is e-Government implementation projects that span

a network of organisations with a wide range of stakeholders, Bostrom and Heinen's (1977a) model is seen to be insufficient to fit the broader context of this domain. Therefore, the model presented here has been informed by the recent literature in the context of this investigation and extended beyond the boundaries of organisation (e.g., Davis et al., 2014; Eason, 2014).

The framework is mainly based on STS theory as a focal theory. It has also been informed by other multidisciplinary theories and theoretical frameworks which have been identified by the review process as a means of explaining the influential factors. These are institutional theory, social exchange theory, transaction-cost economics (TCE) theory, TAM, actor-network theory (ANT), TOE and diffusion of innovation (DOI) theory. While the conceptual framework is informed partially by the TOE framework (Tornatzky & Fleischer, 1990), it does not imply that it is constructed based on the TOE framework, as it includes elements relate to the STS perspective more than the TOE framework. The focal point is that the conceptual framework in this research is based on STS theory and it is a cross-organisational-level model (Eason, 2014). In contrast, the TOE framework is an organisation-level model (Baker, 2012), and is normally associated with DOI theory (Baker, 2012; Oliveira & Martins, 2010; Pateli, Mylonas, & Spyrou, 2020).

The e-Government system is an STS that sits within a wider context, including multiple types of stakeholders, and is influenced by internal and external environmental factors, such as economic factors, political, regulatory, and technical (Davis et al., 2014; Eason, 2014; Gil-Garcia & Flores-Zúñiga, 2020; Zhang et al., 2018; Nograšek & Vintar, 2011). With this, we can extend the view to include the environmental dimension and consider it part of the STS (Eason, 2014; Zhang et al., 2018).

Following this, the main constituting factors are classified into three main dimensions: **Environmental** (Pressure Forces, Policies and Legislations), **Organisational** (Managerial Capability, Structure and Culture, Facilitating Conditions, Attitude and Behaviour) and **Technological** (Technological Readiness, Data Management). The resultant main and sub-factors are presented in Table 3.1.

Dimension	Key Factor	Sub-Factors	Source
Environmental	Pressure Forces	<ul style="list-style-type: none"> • Institutional Isomorphism • Media and the Public • Economic Conditions 	(Bigdeli, Kamal, & Cesare, 2013; Glyptis et al., 2020; Heeks, 2006; Tangi et al., 2020; Welch, Feeney, & Hyun, 2016; Yang & Wu, 2014, 2016)
	Policies and Legislations	<ul style="list-style-type: none"> • Institutional Legitimacy • Regulatory Frameworks 	(Bigdeli & Kamal, 2013; Dawes et al., 2009; Gil-Garcia & Sigit, 2016; Glyptis et al., 2020; Pardo & Tayi, 2007; Pardo et al., 2004; Scholl & Klischewski, 2007; Welch et al., 2016; Yang & Maxwell, 2011; Yang, Pardo, & Wu, 2014; Yang & Wu, 2014)
Organisational	Managerial Capability	<ul style="list-style-type: none"> • Leadership and Support • Strategic Planning 	(Dawes et al., 2009; Ebrahim & Irani, 2005; Gil-Garcia & Sigit, 2016; Glyptis et al., 2020; Nograšek & Vintar, 2014; Pardo, Nam, & Burke, 2012; Yang & Maxwell, 2011; Yang & Wu, 2014, 2016)
	Structure and Culture	<ul style="list-style-type: none"> • Organisational Structure • Organisational Culture • Organisational Politics • Business Processes • Governance and Operations • Motivations and Incentives 	(Bigdeli & Kamal, 2013; Bostrom & Heinen, 1977a; Dawes et al., 2009; Gil-Garcia & Sigit, 2016; Heeks, 2006; Janssen & Cresswell, 2005; Kamal et al., 2015; Kamal, Hackney, & Ali, 2013; Mumford, 2006; Nograšek & Vintar, 2014; Pardo et al., 2004; Pardo et al., 2012; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Tangi et al., 2020; Vallerand & Blssonnette, 1992; Welch et al., 2016; Willem & Buelens, 2007; Yang & Maxwell, 2011; Yang et al., 2014; Yang & Wu, 2014, 2016)
	Facilitating Conditions	<ul style="list-style-type: none"> • Networking • Trust • Stakeholders Engagement 	(Bigdeli & Kamal, 2013; Bostrom & Heinen, 1977a; Choi & Song, 2020; Dawes, 2009; Dawes, Cresswell, & Pardo, 2009; Gil-Garcia

			& Sigit, 2016; Lam, 2005; Mumford, 2006; Pardo et al., 2004; Pardo et al., 2012; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Welch et al., 2016; Yang & Maxwell, 2011; Yang & Wu, 2014, 2016)
	Attitude and Behaviour	<ul style="list-style-type: none"> • Technology Acceptance • Perceived Costs and Benefits • Perceived Risks 	(Bigdeli & Kamal, 2013; Bostrom & Heinen, 1977a; Dawes, 2009; Zhang et al., 2018; Kamal et al., 2015; Lam, 2005; Welch et al., 2016; Yang & Maxwell, 2011; Yang & Wu, 2016)
Technological	Technological Readiness	<ul style="list-style-type: none"> • Technical Capacity • IT Infrastructure and Interoperability 	(Algemili, 2016; Bigdeli et al., 2013; Ebrahim & Irani, 2005; Gil-Garcia, 2012; Gil-Garcia & Sigit, 2016; Glyptis et al., 2020; Heeks, 2006; Janssen & Cresswell, 2005; Kamal et al., 2015; Lam, 2005; Mumford, 2006; Pardo et al., 2012; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Welch et al., 2016; Yang & Maxwell, 2011; Yang & Wu, 2014)
	Data Management	<ul style="list-style-type: none"> • Data Quality and Standards • Data Security and Privacy 	(Algemili, 2016; Bigdeli & Kamal, 2013; Dawes, 2009; Dawes et al., 2009; Gil-Garcia, 2012; Gil-Garcia & Sigit, 2016; Zhang et al., 2018; Janssen & Cresswell, 2005; Lam, 2005; Pardo et al., 2004; Pardo et al., 2012; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Welch et al., 2016; Yang & Wu, 2016)

Table 3.1: The Key Socio-Technical Factors Affecting e-Government Implementation (identified from the literature)

Yet, STS theory has not been extended in the literature to the degree that it explains what specific aspects of social and technical elements lie outside organisational

boundaries, and in what ways they interact, and what the outcomes are and implications of such interaction are. So, this research will attempt to address this gap and such aspects empirically through the analysis of the findings. Accordingly, pertaining to the research objectives, the key factors affecting e-Government implementation are theoretically identified and reviewed in this chapter; the empirical analysis of their effect on the implementation projects under study will be presented in Chapter 5 (Case Studies Analysis and Findings), and the analysis of socio-technical interactions and their implications for e-Government implementation will be explained and discussed in Chapter 6 (Analysis of Socio-Technical Interactions and their Implications for e-Government Implementation and its Success). Figure 3.1 illustrates the conceptual framework. A detailed review of the key socio-technical factors and their sub-factor follows.

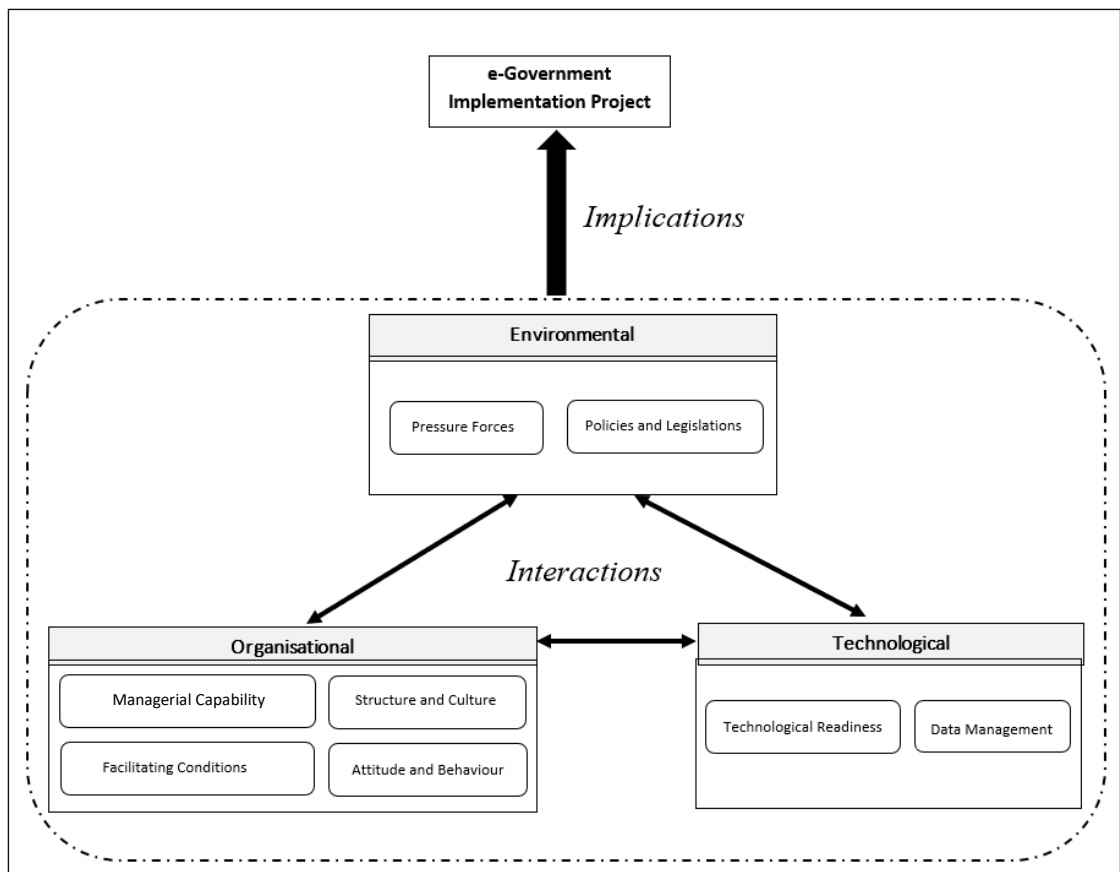


Figure 3.1: Conceptual framework for e-Government Implementation

3.2.1. Environmental Factors

The effect of environmental factors is defined as the extent to which an organisation is influenced by its environment (Heeks, 2006) to adopt a certain practice. The

literature survey regarding the environmental dimension has identified two key influential factors: pressure forces, and policies and legislations.

3.2.1.1. Pressure Forces

Organisations may progressively be engaged in institutionalising ICT initiatives with the influence of external bodies like demand from higher-level authorities and policymakers, the expectation from mass media and the public, and the influence from peer government organisations (Tangi et al., 2020; Yang & Wu, 2016). Therefore, it can be argued that a certain level of environmental pressure demanding and mandating public service improvement may increase an organisation's intent regarding e-Government implementation. There are different types of pressure forces, discussed in the literature, influencing e-Government implementation, including institutional isomorphism, media and the public, and economic conditions. They are described in the following paragraphs.

• Institutional Isomorphism

According to institutional theory (DiMaggio & Powell, 1983), institutional isomorphism are the institutional forces that influence organisations to adapt to their institutional environment. These forces stem from several types of pressure within the institutional context, such as regularity authorities and social and cultural expectations, in which an organisation seeks to attain conformity and greater legitimacy.

Aldrich and Ruef (cited in Yang & Wu, 2016) accentuate that a common feature of all aspects of institutional theory is the environmental impact on organisations. They indicate that changes in organisational structure may be enforced by a higher authority or prompted through social influences. DiMaggio and Powell (1983) suggest that organisations appear to embrace institutional structures through three forms of isomorphism: coercive, mimetic, and normative. Coercive isomorphism results from formal and informal pressure exerted by others in the community in which the organisation operates. According to Welch, Feeney, and Hyun (2016), coercive isomorphism is mandated by law, legislation or regulations that force an organisation to take any action or to follow certain procedures. Mimetic isomorphism means that when faced with confusion, organisations appear to emulate the actions of similar organisations to gain legitimacy. Normative isomorphism primarily exemplifies the attitudes of an organisation's professionals in reacting to certain situations. In the e-

Government implementation context, government organisations are often required to collaborate and to share information by regulations, legislative mandates, or formal policies (Welch et al., 2016).

Therefore, institutional isomorphism could act as a driving force to encourage or push government agencies to implement e-Government.

• **Media and the Public**

Researchers suggest that media and public commentaries play an important role in motivating organisations to take part in data sharing projects (Yang & Wu, 2014, 2016). Furthermore, according to a study conducted by Yang and Wu (2014) regarding cross-boundary data sharing, it was found that participating organisations may be influenced by scrutiny from the media and the public. Media, such as the Internet, television, newspapers, and magazines, can reach the wider public. Similarly, the public also uses the media to express their opinions and propose their ideas. Yang and Wu's study has also indicated that, if data sharing initiatives affect the rights or benefits of the public, the related progress will be carefully followed by media and the public, which may bring significant pressure to bear on organisations. On the other hand, if the public believes that data sharing initiatives harm their rights or privacy, their opposition to such initiatives can negatively influence their intentions concerning data sharing.

Accordingly, the pressure from media and the public can influence organisations to engage in e-Government implementation initiatives.

• **Economic Conditions**

Economic conditions refer to the economic and financial status of the state, and the availability of resources that can influence government plans (Bigdeli, Kamal, & Cesare, 2013). Glyptis et al. (2020) state that a country's budget is an economic indicator that affects the full implementation of e-Government projects. Though, economic conditions can significantly push or constrain government projects such as ICT and e-Government initiatives.

Many countries are currently encountering a global economic decline and are faced with budget shortages, which is expected to reduce their spending and the level of funding that will obstruct any ICT-related effort. For example, Bigdeli et al. (2013) reported that the central government in the UK has planned for a significant reduction

in the current budget which has resulted in cutting the annual LGA budget by more than 7%. In such cases, organisations may find themselves under tremendous pressure to find other ways to develop and deliver their services to the public or face the possibilities of reducing the services themselves. Furthermore, crises, including natural disasters, outbreaks of diseases and national security threats, are also thought to have a major impact on the plans and development efforts of governments. Yang and Wu (2014) found that, in a situation of crisis, organisations participating in data sharing initiatives act instantly, overlooking the concern of data privacy and confidentiality. Thus, a crisis can also affect e-Government implementation.

Based on this, it can be argued that economic conditions may influence e-Government implementation.

3.2.1.2. Policies and Legislations

Policies and legislation have a strong influential effect on data sharing and knowledge exchange programmes among public sector organisations (Dawes, 1996; Dawes & Zhang, 2006; Gil-Garcia & Pardo, 2005; Yang & Maxwell, 2011; Yang & Wu, 2014). Researchers have indicated that regulated and well-defined policies and legislation can improve inter-relationships and enable better collaboration between organisations participating in integration and data sharing initiatives, which may result in increased public trust and reduced risk of data misuse (Gil-Garcia & Pardo, 2005; Lam, 2005; Yang & Maxwell, 2011; Yang & Wu, 2014). Yang and Maxwell (2011) and Dawes and Zhang (2006) also point out that failure to provide legislative support to ensure privacy and confidentiality of shared data may hinder cross-organisational data sharing in the public sector.

Moreover, Yang and Maxwell (2011) assert that relevant players, including legislatures and policymakers, should be involved in maintaining the sustainability of e-Government implementation projects in the public sector by enforcing the process of funding and resource allocation. They found that policies and legislations represent the most critical factors influencing cross-organisational data sharing initiatives in the public sector. Similarly, Janssen and Cresswell (2005) argue that functions and power assigned to public organisations and their administrative and financial autonomy are determined through legislation.

However, Yang and Wu (2014) suggest that policies and legislation may constrain data sharing, at both organisational and state levels, because of old and strict data protection and privacy laws. One interesting finding of these researchers was that some organisations, which had been acting as information receivers, were prohibited by respective organisation-wide regulations from accepting shared information electronically.

Per the above, Dawes et al. (2009) found that a general lack of legislative support and lack of or misallocated funding were perceived as more severe barriers than laws that specifically restrict data and knowledge sharing. Thus, central governments must promote data sharing between governmental units by establishing national-level policies and legislation. For example, Bigdeli et al. (2013) describe how the Cabinet Office in the UK published a White Paper in 2005 which indicated that the central government had placed the enhancement of information sharing policies within LGAs at the core of e-Government projects. To this end, considering policies and legislation as an influential factor for e-Government implementation has been sufficiently justified.

Two sub-factors, related to policies and legislation, were found to have a significant impact on the implementation of e-Government, namely institutional legitimacy and regulatory frameworks. They are detailed further below.

• **Institutional Legitimacy**

Institutional legitimacy is identified by the set of laws or regulations that are required to legislate cross-organisational collaboration and data sharing activities in multi-organisational collaboration contexts. It is the power of authority that enables organisations to acquire or share the resources they need. Gil-Garcia and Sigit (2016) argue that multi-organisational collaboration in the public sector requires institutional legitimacy, which commonly begins with the establishment of legislation and is supported by sponsorship from a well-recognised statutory authority. They note that institutional legitimacy can also be obtained from the involvement of top executives in project governance. Pardo, Gil-Garcia, and Burke (as cited in Gil-Garcia & Sigit, 2016) contend that the top executive's involvement influences governance structures in inter-organisational data sharing projects.

Moreover, the success of inter-organisational data sharing initiatives relies on mutual trust and respect built between the participants through the authority being practised by the executives (Gil-Garcia & Sigit, 2016). In contrast, lack of or misuse of authority leads to distrust and frustration among the participants involved in the initiative (Pardo, Gil-Garcia, & Burke, 2008).

Researchers like Dawes (1996), Lam (2005), Landsbergen Jr. and Wolken Jr. (2001), and Yang, Pardo, and Wu (2014) have also suggested that the statutory authority should identify the instances in which data collected in one organisation can be transferred to other organisations. However, Dawes, Cresswell, and Pardo (2009) argue that formal legal authority without political support may not be sufficient to maintain data and knowledge sharing across the e-Government implementation project. They found that, in practice, legal authority backed with political support provides a more efficient context for implementation. The researchers concluded that the lack of formal authority support, in particular, represents the greatest barrier to attain the objectives of inter-organisational collaboration initiatives.

Meanwhile, the reasons for employing policies and legislations to establish institutional legitimacy are twofold. On the one hand, legislation can positively influence inter-organisational data sharing by creating a healthy environment for a well-regulated and governed data sharing process between the participating organisations and ensure better privacy and security for the shared data (Gil-Garcia & Sigit, 2016). On the other hand, a collaboration between organisations involves shared responsibility and control, which often involves intensive coordination, monitoring and feedback, which, in turn, could potentially damage legitimacy and integrity should collaboration fail (Pardo & Tayi, 2007). As a result, organisations rarely consider data as an asset of the entire government or the public (Dawes, 1996).

• **Regulatory Frameworks**

Regulatory frameworks refer to the set of standards, defined by policies and legislation which sets up an institutional context in which inter-organisational data and information sharing among participating organisations become operative and legitimate (Bigdeli et al., 2013; Gil-Garcia & Sigit, 2016). Gil-Garcia and Sigit (2016) argue that the regulatory framework in which government organisations operate has a significant influence on data sharing and integration. It presents a prerequisite

condition for inter-organisational information sharing (Dawes, 1996). Dawes et al. (2009) note that most of the public sector innovative work largely depends on inter-organisational sharing of data, information, and knowledge and that without an effective regulatory framework, organisations would not be willing to collaborate and share information. Hence, the objectives of data sharing initiatives could merely be achieved.

It has been argued in the literature that public organisations, generally, collect and store the data related to their activities and, in many cases, they are unfamiliar with the regulations and under what circumstance they are allowed to use the data and share it with others (Bigdeli et al., 2013; Gil-Garcia & Pardo, 2005; Glyptis et al., 2020; Lam, 2005). Such ambiguities in legislation and policies would either allow or prohibit the sharing of data, resulting in two crucial outcomes. First, organisations' workers make decisions based on what they think and understand from the rules; and, second, they are reluctant to share data to avoid unintended mistakes (Bigdeli et al., 2013; Lam, 2005).

According to Landsbergen Jr. and Wolken Jr. (2001), the regulations of data policies and standards, timing and methods of data collection, and access to information can all vary widely across organisations. Furthermore, Dawes et al. (2009) state that unless effectively articulated, knowledge about understanding and the reconciliation of these variations may not be attained. They argue that organisations' officials may not participate in innovations that require massive change without a legal framework to reference and act upon.

3.2.2. Organisational Factors

Organisational factors are those factors that are found or enacted inside individual organisations or emerge during a collaborative work of common interest, like e-Government initiatives which entail inter-organisational collaboration and cooperation, sharing of resources, and divisions of costs. The organisational dimension, which contains the factors of managerial capability, structure and culture, facilitating conditions, and attitude and behaviour, has been found influential in e-Government implementation projects. These factors are explained in the following sub-section.

3.2.2.1. Managerial Capability

Managerial capability is defined as the degree to which a government organisation has the resources and skills required to manage and implement ICT initiatives (Yang & Wu, 2016). According to Kamal et al. (2015), management capabilities and support include competent management of ICT operations, coordination and communication with users and stakeholder groups, and project management and control expertise. Additionally, these researchers argue that effective management approaches to information systems implementation and operations involve in-depth knowledge and understanding about the business, and positive perceptions of and support for the information systems units in the organisation. They stress that the organisation's management should possess an overall technical understanding and knowledge and have the necessary skills to develop effective customer-relationships rapport. These capabilities are exemplified in the following set of managerial attributes.

• Leadership and Support

Bigdeli et al. (2013) define leadership, in the inter-organisational data sharing context, as the existence, capacity and commitment of the organisation's senior management to facilitate an enthusiastic environment in which information sharing between various participants can be carried out effectively and efficiently. According to Nograšek and Vintar (2014, p. 116), leadership is "first and foremost, the ability of public managers to recognise the importance of OT [organisational transformation] in the successful implementation of new technologies, understand its dimensions, and support the necessary changes." Bigdeli et al. (2013) note that creating and managing a collaborative network among different departments of an organisation is a very complicated task. They state that this collaborative network is a tied environment where the power is shared among multiple participants, and each has a partial role.

Researchers argue that leadership is one of the most significant factors influencing inter-organisational technology initiatives (Bigdeli et al., 2013; Gil-Garcia et al., 2010; Gil-Garcia & Sigit, 2016; Glyptis et al., 2020; Kamal et al., 2015; Nograšek & Vintar, 2014; Pardo et al., 2012). For example, Kamal et al. (2015) indicate that organisations' leaders who have significant experience and authority in a particular discipline are likely to promote innovation. They offer vision, direction and resources, and support and shape authority to promote initiatives over inter-organisational collaboration and cooperation (Yang & Wu, 2014). Gil-Garcia, Pardo, and Burke (2007) contend that

organisations' leaders, at different levels, have an important role to play in addressing data sharing initiatives. They note that leadership is exerted and exemplified through executive engagement, formal authority and informal leadership. Yang and Maxwell (2011, pp. 169–170) explain these leadership facets as follows.

Executive engagement can help data sharing initiatives through supporting informal leaders, respecting the autonomy of participating organisations, encouraging employees to participate, and providing financial resources. Formal authority can help build agreement among participating organisations, create an environment to develop appropriate and effective strategies, and help key players get involved. Informal leadership can help build trust among participants, facilitate their interactions, provide localised solutions to complex problems, and clarify the roles and responsibilities of participants in the collaborative process.

In particular, formal authority, as stated by Yang and Wu (2014), can create an environment for implementing impactful data sharing strategies by setting agreements between stakeholders, and encouraging key players to get engaged. Yang and Wu's (2014) findings suggested that authority involvement can influence inter-organisational data sharing initiatives in two dimensions: horizontal and vertical. The horizontal dimension is across the level of the participating organisations, in which the local authorities in each participating organisation can emphasise the importance and augment the priority of data sharing initiatives. On the other hand, the vertical dimension reflects how a higher-level organisation can participate in the programme and act as a mediator to supervise and foresee the progress of the data sharing initiatives. Gil-Garcia and Sigit (2016) advocate that leadership can be exhibited through a variety of methods. The authors have identified positive top management support, attention, and active engagement as enablers for inter-organisational information integration. Also, the researchers have highlighted the importance of leadership in managing ICT projects, in which project managers play a vital part in synchronising the implementation schedule with the management of project tasks and resources.

In the same context, Pardo et al. (2012) contend that leadership is a key management capability for e-Government implementation initiatives. They state that a lack of leaders and champions within public organisations is a barrier to data sharing.

Champions can articulate a clear and compelling vision of their agenda, build support for it, develop communities of practice within their jurisdiction, and actively engage in other practice groups (Pardo et al., 2012). In the same vein, Dawes et al. (2009) believe that quality leaders who possess interpersonal skills are linked to success. These skills include goal focus, emphasis on people and engagement, willingness to challenge, and promotion of a culture of shared responsibility for success. The researchers point out that such behaviours can support collaboration and inspire trust, commitment, adaptation, and reciprocity among the participants. They argue that the most successful initiatives have been led by people who stressed the value of the initiative and focused first on the people involved, not on the rules of engagement or the detailed contents or factual resources. Such model leaders employ open communication with all the stakeholders and use examples and arguments to convince the participants of the overall and individual benefits (Dawes et al., 2009).

In the context of this research, support refers to upper management's commitment to the power of authority to foster and provide a supportive environment that encourages government organisations to engage in public ICT projects. Top management support has been consistently found to play a critical role in the implementation of ICT solutions in an inter-organisational context in particular (Dawes, 1996). According to Yang and Maxwell (2011), top management support is exemplified in the articulation of vision and providing guidance and resources, which can help accomplish and sustain inter-organisational information sharing. Kamal et al. (2015) argue that it is widely recognised that several issues attended to by top management are typically more convoluted and ambiguous than those discussed in the middle management level. They note that decisions taken by top management are influenced by political behaviours that might be unseen by other individuals in lower organisational levels.

• **Strategic Planning**

According to Pardo et al. (2012), strategic planning is an important aspect of managerial capability. The authors note that strategic planning capability reflects a clear e-Government vision and strategic goals to ensure the high level of involvement of all stakeholders in systemic planning efforts. In such efforts, governance and project management processes are integrated with the e-Government strategy to facilitate a joint venture of public and private organisations to develop a long-term plan of inter-organisational collaborations, devise a change management strategy, and augment the

alignment between the e-Government vision and the organisational line of business. Ebrahim and Irani (2005) contend that a comprehensive e-Government strategic plan is fundamental for successful, cost-effective, implementation of e-Government services and reform of the public administration. The absence of an effective national e-Government strategy may undermine e-Government adoption efforts (Al-Moalla & Li, 2010). The continuous evaluation of the strategic plan is also an important mechanism to monitor the progress of the initiative, manage project budgets and deliverables, and assess the performance and quality of the implementation (Pardo et al., 2012).

3.2.2.2. Structure and Culture

Organisational structure and culture are among the most significant barriers encountered in organisational transformation (Tangi et al., 2020). Scholars highlight how public sector organisations have been criticised for not being able to adapt to the changes required in technological intervention (e.g., Janssen & Cresswell, 2005; Mcivor, Mchugh, & Cadden, 2002). They note that despite the huge investments in technology implementation, changing organisational attributes such as culture, structure, business processes and reward systems is often difficult to accomplish. These attributes may become barriers that can potentially hinder e-Government project success. For example, Gil-Garcia et al.'s (2007) findings of the study regarding information sharing in the public sector in the USA identified three key structural and cultural constraints limiting information sharing, these being centralised decision-making that ignores individuals' opinions, conflicting objectives among participating organisations, and overwhelming expectations from the stakeholders.

The literature survey, conducted for this study regarding the set of influential structural and cultural factors, has identified six key sub-factors associated with this category. These are organisational structure, organisational culture, political context, business processes, governance and operations, and motivations and incentives.

• Organisational Structure

Organisational structure is a key determinant of the success of inter-organisational information sharing (Gil-Garcia & Sigit, 2016) and digital transformation (Tangi et al., 2020) in the public sector. In this respect, Janssen and Cresswell (2005) contend that hierarchical bureaucratic structures normally exemplify a classical culture that

accentuates risk aversion and fosters functional silo control. Bigdeli et al. (2013) propose that extensive changes are required to transform the culture of those organisations that have previously operated in an isolated environment and are now called upon to function as part of a collaborative network, especially in the public sector.

Yet, most government activities are defined and funded through legislation that defines specific programmes and assigns their responsibility to the individual organisations (Gil-Garcia & Sigit, 2016; Pardo et al., 2004; Pardo & Tayi, 2007). Such programmes create boundary barriers and hold the individual organisations to focus on their programmes in favour of collaboration with others (Bigdeli et al., 2013; Pardo & Tayi, 2007; Yang & Wu, 2014). Additionally, pre-existing regulations that define the bureaucratic system and mode of operations could become barriers that impede inter-organisational data sharing, particularly sensitive or privacy-related data, among organisations (Dawes, 1996; Gil-Garcia & Pardo, 2005; Yang & Maxwell, 2011; Yang & Wu, 2014).

Structural variables such as centralisation, formalisation and other bureaucratic attributes influence communication and information flow within or between organisations (Fountain, 2001; Gil-Garcia & Sigit, 2016). Organisational and functional boundaries might spread information in such a way that nobody, including top management, is fully familiar with business processes (Janssen & Cresswell, 2005; Kamal et al., 2013). In such cases, data and information are not regarded as a public resource but as an asset owned, where the circulation of which may be limited. Likewise, Mcivor, Mchugh, and Cadden (2002) argue that one of the major issues in the application of ICT in the public sector is that organisational structures and functions have failed to keep pace with technological changes. This raises concerns over STS design where the socio-technical approach suggests active participation of lower-level groups in decision-making, but the reality of power structures is that innovation is often halted if the current organisational structure is affected by the change (Mumford, 2006). Organisational structure, mainly formalisation, specialisation and standardisation of work, is affected by e-Government implementation; tasks can either become centralised or scattered over various workplaces as they are automated and embedded into information systems (Nograšek & Vintar, 2014). In this respect, Welch et al. (2016) maintain that organisations that

are more centralised in structure and more rule-based have better readiness to handle complex data sharing practices and are more likely to maintain central repositories of data that are easier to access and manipulate. The rationale behind this claim, as the authors suggest, is that data sharing requires a higher-level of coordination and that centralised structures, by nature, entail more direct coordination and control over work activities. In contrast, organisations that are more decentralised and less rule-governed may be less able to react to requests requiring the coordinated provision of data or multiple layers of approval and supervision (Welch et al., 2016). For example, Jain, Ramamurthy, Ryu, and Yasai-Ardekani (1998) found that information systems managed by centralised decision-making organisations are likely to result in more successful data resource management compared to other organisations.

• **Organisational Culture**

Organisational culture is defined as the pattern of common basic assumptions formed and established by a particular group to manage external adaptation and address internal work issues (Yang & Wu, 2016). In addition, Wilson (as cited in Yang & Wu, 2016, p. 381) defines organisational culture as “the patterned and persistent way an organisation carries out its tasks and operations”. Another generic definition of organisational culture is: “the way we do things around there” (Kamal et al., 2015, p. 140). Whereas Hofstede (as cited in Kamal et al., 2015) defines organisational culture as the collective programming of the mind which distinguishes the members of one organisation from another.

It is argued that organisational culture can have an enormous effect on e-Government implementation (Kamal et al., 2015; Pardo & Tayi, 2007; Tangi et al., 2020). According to Yang and Wu (2016), organisational culture can gradually be introduced into the minds of individuals and act as a set of normative values to favour the interests of the organisation. Pardo and Tayi (2007) contend that an STS is embedded in an environment that is influenced by a culture and its values and sets of commonly accepted practices, where the environment allows organisations, groups, and individuals to carry out certain activities. The researchers note that if a task conflicts with an organisation's culture, its members may undertake the task with less effort or even resist acting upon it.

Yang and Wu (2014) indicate that government organisations having a culture favouring open innovation tend to support innovative practices and foster data sharing

with other organisations. Moreover, Nograšek and Vintar's (2014) findings suggest that some organisations tend to encourage or discourage respective organisational cultures and values based on their missions and operations. For instance, the researchers note that organisations that are designated to act as data providers are more willing and open to share data with others. Whereas at the opposite end of the spectrum, 'special mission' agencies, such as police and tax agencies, have a more conservative attitude toward sharing the data with other organisations.

Researchers suggest that information and knowledge sharing may require complex interactions between participating organisations due to their different backgrounds, values and cultures (Lam, 2005; Nograšek & Vintar, 2014; Pardo et al., 2004; Pardo & Tayi, 2007; Yang & Maxwell, 2011). Due to the various cultures that may exist in the same organisation or across organisations, people in one culture are less likely to know what information people may need from other cultures, which could reduce confidence in the quality of the shared information (Yang & Maxwell, 2011). In particular, Nograšek and Vintar (2014) indicate that organisations of diverse cultures tend to view and treat information differently. In such a case, the authors note that the negotiation and collaboration between organisations with different cultures and values usually take time and entail cost.

Another key cultural barrier, as indicated by Pardo et al. (2012), which may make government organisations act defensively and discourage information sharing is the mindset in which information is regarded as power: literally, 'information is power'. To tackle this barrier, the authors suggest the development of a clearly and specifically defined government-wide data and information sharing policy that would promote and facilitate data sharing practice. Although a change in an organisation's culture is advocated while undertaking e-Government implementation, government organisations typically have a risk-averse culture that makes such a change difficult to achieve (Pardo & Tayi, 2007).

• **Organisational Politics**

According to Bigdeli et al. (2013), organisational politics refers to the influence of the power of decision-making within the organisation. This influence causes enormous effects on the collaborative network, and so on inter-organisational data sharing efforts, thus exerting a strong institutional and situational impact on e-Government

implementation (Gil-Garcia & Sigit, 2016; Pardo et al., 2004; Pardo & Tayi, 2007). Bostrom and Heinen (1977a) contend that organisational politics arise due to conflicts of interest among various groups, and the perception of organisations' members toward the shift of power caused by the changes implied by information systems implementation. Heeks (2006) argues that organisational politics and self-interest issues are considered as important elements to organisations, and they are even covered in organisations' strategies. Similarly, Gil-Garcia and Sigit (2016) describe conflicting interests between organisations participating in data sharing initiatives as 'political distance' influencing e-Government implementation. They state that when political distance exists, participants are less likely to engage in a network collaboration for information and knowledge sharing. Furthermore, Gil-Garcia (2012) notes that political issues are overwhelming and hard to overcome, particularly when the political context is surrounded by disputes and competing issues.

In this context, researchers point out that organisations participating in collaboration and knowledge sharing programmes have diverse goals and competing priorities stemming from their designated missions (Dawes et al., 2009; Yang & Maxwell, 2011), not to mention the issues of division of cost and authority across jurisdictions. Scholl and Klischewski (2007) state that interoperation between organisations becomes convoluted as the number of participating organisations with conflicting interests and wants grows. The researchers, however, suggest that integration and interoperation would emerge later given that shared interests and demands are brought to a common ground. Researchers also indicate that information is an important source of power in organisations (Dawes, 1996; Pardo & Tayi, 2007; Yang & Wu, 2014). Yang and Wu (2014), for example, point out that power issues in organisational politics have an impact on the sharing of information among organisations. Specifically, in the public sector, organisations are concerned that sharing information could cause power loss, including financial assets and competitive advantages (Pardo & Tayi, 2007; Yang & Maxwell, 2011). It has also been argued that inter-organisational information sharing may increase the potential for more open and public scrutiny and quality appraisal of the participating organisations (Landsbergen Jr. & Wolken Jr., 2001; Pardo & Tayi, 2007; Yang & Maxwell, 2011). Thus, organisations tend to resist sharing information across boundaries when information is viewed as a source of power and sign of authority (Dawes, 1996).

In the same vein, Irani, Love, and Jones (2008), in their study, observed that organisational politics influenced e-Government implementation projects as decisions were designated to middle managers when such decisions are made for political reasons and not to meet practical needs. Kamal et al. (2015) argue that the political aspect of organisational status can significantly shape the nature of the decision-making process. They further note that reliance on outsourcing IT projects to external vendors can be related to political decisions.

However, to resolve inter-organisational political issues, researchers like Landsbergen Jr. and Wolken Jr. (2001), Yang and Maxwell (2011) and Yang and Wu (2014) propose the existence of political leadership as an explicit statutory authority, defined as a government authority that can oversee the implementation and governance of an e-Government project. They argue that e-Government initiatives could be more easily implemented when there is a common executive leadership. Such leadership would eliminate the reluctance of organisations to share data when they realise that collaborations are under statutory mandate (Dawes, 1996; Lam, 2005; Landsbergen Jr. & Wolken Jr., 2001). In addition, other researchers recommend that data and information sharing issues arising due to political reasons may be overcome by institutional pressure and by promoting a culture of information stewardship rather than information ownership (Pardo et al., 2004; Yang & Maxwell, 2011), as well as through the creation of practical tools such as metadata inventories and formalised data sharing agreements (Dawes, 1996).

• **Business Processes**

e-Government implementation requires large-scale integration of information systems that are commonly understood to incorporate processes and information flows into complex software. This complex network of systems often becomes difficult to change and has strong implications for the organisation's work and its members (Pardo et al., 2004). Further, system integration projects are often risky and highly complex, requiring the redesign of cross-boundary business processes and organisational reform (Kamal et al., 2015). However, business processes can widely differ in organisations in such a way that integration and interoperation can be extremely difficult to achieve without standardising processes, systems and policies (Fountain, 2001; Scholl & Klischewski, 2007). Additionally, different organisations have their respective operating procedures, control mechanisms and workflows which increases the

difficulty of systems integration and information sharing (Pardo et al., 2004; Yang & Maxwell, 2011).

Although many researchers have advocated business process reengineering (BPR) to overcome the complexity of integration, it has been argued that there is little reliance on reengineering public sector business processes since, in the public sector, bureaucratic structure and functions are often difficult to change (Bigdeli et al., 2013; Janssen & Cresswell, 2005; Kamal et al., 2013). For example, Bigdeli et al. (2013), in their study of information sharing in the LGAs in the UK, found that each department had specific business rules and policies that dictated business process flows, the thing that made information sharing collaboration uncontrollable.

According to Pardo and Tayi (2007), business process integration requires understanding and mutual adjustment of the work processes of multiple organisations. However, scholars argue that the existence of separate operating procedures, control mechanisms, and information and workflow makes such integration extremely difficult, leading to serious problems or complete failure of information systems that depend on it (Fountain, 2001; Pardo et al., 2004; Pardo & Tayi, 2007). These difficulties stem from the context of the participating organisations in which diverse perspectives, that reflect organisations' history and attributes, are introduced to the sharing process (Dawes, 1996; Pardo & Tayi, 2007).

Bigdeli et al. (2013) also contend that there has been a range of studies on the integration and sharing of information in the public sector showing that electronic information sharing between different departments would only save cost and improve performance if business processes were aligned or combined.

• **Governance and Operations**

According to Pardo et al. (2012), governance is an important aspect in the development of inter-organisational ICT initiatives. Pardo et al. (2008) argue that setting up an effective governance structure is necessary to maintain enterprise-wide organisational capabilities for sustainable inter-organisational collaborations and information sharing processes. They suggest that governance structure should encompass knowledge of available information, knowledge of the environment, the degree of willingness to accommodate the diversity of participating organisations and their goals, knowledge

about participating organisations and stakeholders, legislation, and executive involvement (Pardo et al., 2008, pp. 6–8).

According to Pardo et al. (2012), governance represents a framework, for socio-technical systems, for decision rights and liability to encourage appropriate behaviour in the exploitation of resources and provide clearly defined concepts, roles, responsibilities, stewardship and regulatory strategies. Gil-Garcia and Sigit (2016) contend that success is often connected to the governance structure of the initiative, which considers the interrelatedness of knowledge and information among various project participants.

On the other hand, operations complement governance. Operation management is classified into two key categories, being project management and resource management. They are described as follows (Pardo et al., 2012).

Project management capability is the competence to manage projects effectively within organisations, which requires technical skills and tools, organisational structures for project assessment and analysis and a systematic approach to governance, and policy objectives and targets. It also requires managing stakeholders and gaining their agreement regarding a common project management practice. The capability also encompasses the vision to align multiple large-scale e-Government projects to the strategic e-Government plan. The lack of adequate capacity to manage complex and large-scale e-Government projects is a consistent and key concern in e-Government implementation (Pardo et al., 2012).

Resources management capability is related to the ability to identify, acquire, and manage the resources required for interoperable e-Government, including financial, human, and technological properties. In this context, Heeks (2006) identifies resources as, primarily, the time and money required to implement and operate the e-Government system. Regarding financial management, Scholl (2005) notes that identifying costs incurred to participating organisations and stakeholders is of vital importance.

Janssen and Cresswell (2005) contend that the involvement of multiple stakeholders representing autonomous organisations with separate budgets, and the uncertainty about the costs and anticipated benefits of ICT implementation in the public sector is a core issue. They argue that failure to estimate the division of cost between

participating organisations concerning the anticipated return can extremely confine development efforts. Researchers advocate the establishment of an economic framework to analyse cost and calculate the return on investment (e.g., Bigdeli & Kamal, 2013; Landsbergen Jr. & Wolken Jr., 2001; Pardo & Tayi, 2007). However, the perception of the cost and benefits in public sector organisations regarding new ICT-related investment is fairly poor (Bigdeli et al., 2013).

- **Motivations and Incentives**

Bostrom and Heinen (1977a) argue that an STS design should be based on a detailed knowledge of both the strengths and limitations of human resources as information processors, where the interaction gap between the person and the computer system in such a design should be narrowed without overlooking the motivational aspects.

Transaction-cost economic (TCE) theory suggests that incentives can play an important role in e-Government implementation (Pardo & Tayi, 2007). Organisations that spend their resources, such as the budget, staff, networks and time, to gather data and build knowledge are often unwilling to share their knowledge with other organisations without suitable compensation (Pardo & Tayi, 2007; Yang & Maxwell, 2011). Researchers argue that incentives are a key factor in motivating data sharing behaviour (Pardo & Tayi, 2007; Yang & Wu, 2014).

Vallerand and Blssonnette (1992) classify motivations into two types, intrinsic and extrinsic. Intrinsic motivation refers to the motivation that comes from inside an individual rather than from any external source. Extrinsic motivation refers to a behaviour that reacts to tangible or social rewards that come from outside the individual. According to Willem and Buelens (2007), even a few incentives that are based on intrinsic and extrinsic rewards can inspire collaborative behaviours in government organisations.

The essence of incentives could be organisational or financial which affect the progress of collaboration and data sharing initiatives between organisations (Dawes et al., 2009; Gil-Garcia & Pardo, 2005; Pardo, Gil-Garcia, & Burke, 2006). For example, Dawes et al.'s (2009) findings demonstrated how financial incentives, training programmes, and grant-funded programmes all have led to modest but beneficial participations, which eventually moved the information-sharing initiative forward.

Finally, the most important value offered by STS design that directly touches human resources, as indicated by Mumford (2006), is that although technology and organisational structures may change, the workers' rights and needs should be protected and must be regarded as those of the non-human parts of the work system.

3.2.2.3. Facilitating Conditions

Researchers indicate that information sharing and collaboration activities are regarded as IT projects involving the construction of information systems or the adoption of new technologies to achieve information sharing goals (Yang & Maxwell, 2011; Yang & Wu, 2014). In e-Government implementation projects, collaboration regarding business process integration, information systems development, data sharing and other activities are imperative (Gil-Garcia et al., 2007; Yang & Maxwell, 2011). According to Lam (2005), e-Government projects involve the creation of new collaborative processes between government organisations. Likewise, Gil-Garcia and Sigit (2016) contend that inter-organisational information sharing requires cooperation between participants from various, and often competing, agendas and goals of diverse interest. Efforts to achieve effective collaboration may not be met without the availability of appropriate facilitating conditions. Facilitating conditions of trusted inter-organisational networks are key to effective sustainable collaboration (Gil-Garcia et al., 2010; Gil-Garcia & Sigit, 2016; Pardo et al., 2008).

Facilitating conditions, as defined by Yang and Wu (2016), are described as the extent to which the government organisation believes it can obtain resources and assistance from other organisations and agencies to support its innovation project. During the innovation process, Rogers (1995) asserts that getting support from others to support innovations and solve problems is essential within a social system of interrelated individuals or organisations (Yang & Wu, 2016). Therefore, we propose that facilitating conditions, including support from a higher-level authority, collaboration and experience sharing from other agencies, and acquisition of the necessary resources, would influence government organisations efforts in e-Government implementation.

In this research, and in light of what has been discussed in the literature, the facilitating conditions key factor has been sub-categorised into three sub-factors which are

networking, trust, and stakeholder engagement. They are discussed below as part of the conceptual design of this research.

- **Networking**

Networking among stakeholders is an important concept in STS design. According to Mumford (2006), David Herbst, in 1974, created a socio-technical organisational design, as an alternative to the traditional work hierarchies, that is still in favour today. Herbst's work included the design of networks, which suggests that people would be able to collaborate even though they do not know each other and may be physically distant.

Bigdeli et al. (2013) state that the delivery of public services is facilitated by networks of inter-organisational collaboration where information and resources can be efficiently shared. However, the researchers note that the creation of collaborative networks has been reported in the literature as complex and lengthy because the participating organisations can have different commitments, diverse cultures, as well as conflicting priorities and goals. Furthermore, Dawes et al. (2009) contend that participants may not have the same perception of risk, and, therefore, disagree about what can or cannot be shared. They describe how common areas of disagreement could include issues of privacy, confidentiality and security, ambiguity regarding statutory authority to collect, share or disclose information, and levels of openness to public access.

Pardo et al. (2012) describe that cross-organisational collaboration is about teaming together and making collective decisions. To achieve this harmony, the authors suggest that readiness for collaboration and cross-organisational compatibility are the two most important aspects that allow access to the available resources of human and financial assets. Pardo and Burke (2008) define cross-organisational compatibility as the degree to which the work styles, interpersonal relationships, participation in decision-making, levels of competition and collaboration, styles of conflict resolution, and organisational cultures support information sharing. Pardo et al. (2012) note that collaboration readiness is achieved when organisations have cross-organisational compatibility. It is argued that incompatibility across organisations is a significant barrier to information sharing and interoperability (Dawes et al., 2009; Pardo et al., 2012; Scholl & Klischewski, 2007b).

• Trust

Trust, in the inter-organisational context, refers to the belief that a government organisation will perform actions that result in beneficial outcomes for the organisation and it will not perform actions that would result in undesirable results (Faerman, McCaffrey, & Van Slyke, 2001). Trust is a critical factor that can facilitate effective communication and information sharing between organisations (Willem & Buelens, 2007; Yang & Wu, 2014). As Dawes et al. (2009, p. 396) have put it, “trust influences how culture, values, and personal and organisational relations influence the processes and outcomes of knowledge sharing”.

According to Yang and Maxwell (2011, p. 169), there are three types of trust in inter-organisational information sharing, these being calculus-based trust, identity-based trust, and institution-based trust. Calculus-based trust represents the situation when the trustor tends to assess the trustworthiness of the trustee; identity-based trust is based on the long-term establishment of personal relationships with the trustee; and institution-based trust is produced on the institutional structures, organisational cultures, societal norms, and legal systems. Researchers like Pardo et al. (2006) also suggest that the clarity of roles and responsibility, respect for autonomy, and the appropriate exercise of authority contributes to trust-building among public sector organisations participating in inter-organisational information sharing. Dawes et al. (2009) also assert that identity-based trust is necessary when sharing implicit knowledge while building this type of trust normally takes considerable time and interaction. However, the authors accentuate that the quality of existing personal and professional relationships greatly affects the time needed to build trust for new initiatives.

Dawes et al. (2009) contend that trust takes various forms that work best under certain situations, where lack of adequate trust, or the appropriate type of trust, can be a significant barrier to information sharing in the public sector. Moreover, Willem and Buelens (2007) point out that leadership can be used, along with trust, as a power for the reinforcement of inter-organisational information sharing. However, some researchers have indicated that trust may decline when other organisations are cautious about the loss of autonomy or abuse of information that would require accountability for the sharing organisation (Yang & Maxwell, 2011; Yang & Wu, 2014).

In the context of this research, where multiple parties influence and are influenced by the e-Government implementation projects under investigation, trust is inclusively concerned with the multiple stakeholders of the projects.

• Stakeholders Engagement

Pardo et al. (2008) contend that stakeholders are key to successful government reform. They indicate that the governance process of e-Government projects should incorporate every stakeholder, including salient and non-salient bodies. In accordance with this, Scholl (2005) noted that a stakeholders' analysis is indispensable in e-Government implementation projects and that the analysis should be focused on the degree of stakeholder's influence and trust in the initiative.

From STS perspectives, Bostrom and Heinen (1977a) argue that stakeholders, and particularly users', engagement in STS design should start from the very beginning of information system development, covering the strategic design phase, and throughout the project phases. The strategic design phase, as the researchers note, precedes system design activities by formulating and reformulating the goals and policies needed to guide the system's design activities. The authors also suggest that system design responsibility should be assigned to the users and should not be left to the technical designers. They emphasise that "more attention needs to be given to the strategic design phase and the appropriate sharing of models, assumptions, and goals between users and designers to develop meaningful collaboration" (Bostrom & Heinen, 1977a, p. 24). System designs, as they believe, have a high probability of failure if the users do not assume responsibility for the system.

Likewise, Dawes et al. (2009) advocate addressing stakeholder engagement earlier in the planning process, which would promote front-line conversations that clearly define and include stakeholders. Early stakeholders engagement, as the researchers suggest, can clarify benefits, challenges and risks, as well as state the underlying assumptions about how the participants are going to collaborate and make decisions. The researchers assert that all and every stakeholder need to be engaged because different stakeholders perceive benefits and barriers differently and that no single view is perfect, but rather all opinions are of interest and must be heard and expressed openly from the outset.

Mumford (2006) explains that there are two fundamental values of stakeholder's engagement regarding STS. The first one is that the essence of individual needs must originate from workers linked to technology and who are affected by the new working procedures and technical systems, in democratic and participative discussions. The second one is that participation should be facilitated to encourage individuals to express their concerns and engage in the decisions associated with them.

Nowadays, technology and social media platforms allow different communities to stay closely in touch with governments to express their opinions and share their thoughts. According to Welch et al. (2016), it is well known that government agencies can easily and effectively exchange data and information with people and external stakeholders in the private and non-profit sectors through their websites or other communication channels. In this regard, social media has been playing a significant part in facilitating open participation and promoting the sharing of government information.

Stakeholders' engagement and networking have been found to be interrelated (Choi & Song, 2020), and a strong tie of networks between the different e-Government project stakeholders should be established to identify the various roles of every stakeholder and to understand the various common and conflicting interests. Some scholars have also explained this association through ANT (Callon, 1986; Latour, 1987). For example, Gunawong and Gao (2017) describe that ANT aims to define the mechanism by which a group of actors unites into networks to achieve a common goal of interest. The authors used ANT as a theoretical lens to investigate the reasons behind the failure of Thailand's Smart ID Card e-Government project by analysing how different actors betrayed the actor network. Also, Stanforth (2007) used ANT as a framework for understanding the processes of implementing an e-Government system in Sri Lanka, particularly a financial management information system.

3.2.2.4. Attitude and Behaviour

Attitude is defined by Gilbert, Fiske, and Lindzey (1998) as a “mental and neural state of readiness, organised through experience, exerting a director dynamic influence upon the individual's response to all objects and situations with which it is related.” (Kamal et al., 2015, p. 138). In the context of this research, attitude represents the individual's or organisation's perception of e-Government implementation, and

behaviour is the extent to which the individual or organisation engages in the process (Yang & Wu, 2016).

According to Bostrom and Heinen (1977a), the implementation of a new technical system causes several behavioural issues, varying from absolute damage to non-use of information systems. Their findings suggest that the resultant system would fail unless practical steps were taken to identify and resolve behavioural problems. Likewise, Taylor (as cited in Bostrom & Heinen, 1977a) concluded that the direct implications of introducing a technical system into an organisation may create instability in the social system and stimulate different social behaviours. Regarding e-Government implementation, Kamal et al. (2015) contend that researchers still argue that benefits sought from e-Government implementation remain unsatisfactory for multiple technical and social reasons, but human attitude and behavioural aspects are the most influential factors.

In the literature, three attitude and behaviour sub-factors related to the topic of this research have been found to be influential, these being technology acceptance, perceived costs and benefits, and perceived risks. Accordingly, they are described below.

• **Technology Acceptance**

TAM theory (Davis, 1989) suggests that people's intention to accept technology is based on two factors, perceived ease of use and perceived usefulness (King & He, 2006; Zhang et al., 2018). In this context, Nograšek & Vintar (2014) describe how ICT implementation normally requires certain operations to take effect, such as the procurement of new hardware and software products, and new job design. Such operations require organisational changes and may affect people's intentions regarding accepting the new technical solution and coping with its implications. Technology acceptance addresses staff attitudes towards new technology adoption and innovations in an organisation involved in e-Government implementation initiatives (Pardo et al., 2012). In this respect, Yang and Wu (2014) contend that attitudes towards technology acceptance can be shaped by respective organisational values, norms and cultures.

Moreover, Bigdeli et al. (2013) explain that the diffusion of DOI theory (Rogers, 1995) has identified the attributes of innovation, including benefits, expense, complexity,

risk, testability and observability, that are crucial to acceptance and decision-making. The authors note that staff with comprehensive innovation experience are more confident and open to innovation and are more enthusiastic about accepting new tools and techniques. In this respect, Lam's (2005) findings, regarding e-Government implementation, highlight the need for changes in peoples' mindset to understand e-Government programmes as a shift from bureaucracy to a service-oriented paradigm. He argues that "e-Government represents one of the most intensive programmes of change within the public sector" (Lam, 2005, p. 521).

Several researchers have also advocated the importance of embracing BPR programmes to manage change and facilitate technology acceptance in organisations (e.g., Lam, 2005; Yang & Maxwell, 2011). However, Yang and Maxwell (2011) warn that the effort of adopting BPR, to redesign the inter-organisational data sharing processes among participating organisations, may be confronted by resistance-to-change from some individuals due to personal interests and fear of a power shift. Nevertheless, Kamal et al. (2015) contend that top management's attitudes and behaviours in selecting the appropriate technology and managing the change are critical for technology acceptance and e-Government success.

In addition, it has been discussed in the literature that an individual's attitude can also contribute to the overall organisation's attitude. For example, Kamal et al. (2015) maintain that by default, no person is identical to another and that there are several ways to distinguish individuals, and that personality distinction is the most widely known criteria for distinguishing people. The researchers note that "there are four different general factors that can form the personality of people, such as genetic (e.g., factors that influence physical and mental characteristics of a person), social (e.g., factors that influence personality that arises from interaction with other people), cultural (e.g., factors such as wider social beliefs, values and motives that are absorbed by an individual and guide him/her towards a behaviour which is acceptable within a specific social context) and situational (e.g., such factors that put the effect of a specific experience or situation on an individual's feelings and behaviour) factors" (Kamal et al., 2015, p. 138). More specifically, in the technological change context, Dawes (2009) reports that the factors associated with an individual's attitude and behaviour extend further beyond the concept of socio-technical interaction. He argues that for any individual, self-integrity, identity, autonomy, personal choice, privacy, trust,

adjustment and learning, and acceptance of change are essential considerations, regardless of any particular technology. However, the researcher emphasises that when technology comes into play, certain individual's attitudes arise; these include the ability to access and interpret information and handle information overload, and the role and power of users in the design and operation of systems that affect them.

• **Perceived Costs and Benefits**

Drawing on Bigdeli et al.'s (2013) definition of cost, perceived cost, in the context of this research, refers to all the perceived potential costs for an e-Government implementation project, including the cost of consultation work, procuring and/or developing relevant hardware and software, migration from old to new systems, as well as personnel training costs.

Researchers argue that perceived cost has a two-sided effect on the public organisations participating in data sharing initiatives. It may either discourage participating parties due to unclear expected benefits (e.g., Landsbergen Jr. & Wolken Jr., 2001; Irani & Love 2002; Dawes, 1996) or inspire them to establish a data sharing initiative and increase their efficiency (e.g., Gil-Garcia et al., 2010). In this respect, Dawes (1996) contends that since data sharing with other organisations diverts resources from other organisation needs, it is very difficult for organisations to work in favour of another organisation using their reduced resources. Also, Landsbergen Jr. and Wolken Jr. (2001), and Irani and Love (2002) assert that the benefits and costs of data sharing remain uncertain because of inadequate cost-benefit analysis in government organisations, and thus, organisations could hardly be encouraged to participate. In the same vein, Scholl and Klischewski (2007) note that limited budget constraints might impact integration and interoperational efforts between organisations since such effort requires the sustainability of operations and, thus, ongoing funding. However, in contrast, Gil-Garcia et al. (2010) argue that inter-organisational collaboration should lead to the sharing of resources between participating organisations (such as software, knowledge etc.), thereby reducing their transaction costs.

On the other hand, perceived benefit, as defined by Yang and Wu (2016), refers to the extent to which an organisation believes that e-Government implementation helps to achieve efficiency in service delivery and operational gains in performance. Whereas

Kamal et al. (2015) define it as the degree to which a government organisation believes that e-Government implementation can help to gain potential benefits like financial return, power and outside appreciation.

Researchers argue that the benefits perceived by a government organisation while engaging in an inter-organisational data sharing initiative can be an improvement in performance, and lead to better efficiency and effectiveness in its operations and delivery of public services (Bigdeli et al., 2013; Zhang et al., 2018; Yang & Wu, 2016). This would, in turn, increase an organisation's intention to engage in such an initiative (Yang & Wu, 2016).

According to Yang and Wu (2016), social exchange theory suggests that people or organisations who voluntarily share resources with others tend to believe or expect that others would offer a return in the future. Meanwhile, from the perspective of TCE theory, it is argued that government agencies tend to balance cost, benefits and risks before intending to share data and resources (Kamal et al., 2015; Pardo & Tayi, 2007).

Kamal et al. (2015) argue that perceived benefits play a critical role in data sharing while government organisations need to allocate limited resources of budget, time and manpower to gather and process data for sharing. Bigdeli et al. (2013) suggest that to encourage organisations to share their data and information, the expected benefits and satisfactory returns should be made clear from the outset. They also assert that a reward system should be put in place to motivate decision-makers in the public sector for realising the potential benefits that government organisations get from sharing their data.

• **Perceived Risks**

Based on Yang and Wu's (2016) definition, perceived risk, in the context of this research, refers to the degree of potential concerns that a government organisation has in terms of its engagement in an e-Government implementation project. Researchers argue that perceived risk is one of the key potential factors influencing e-Government implementation, and, specifically, data sharing activities (Bigdeli et al., 2013; Dawes, 1996; Dawes et al., 2009; Kamal et al., 2015; Welch et al., 2016; Zhang et al., 2018).

In the context of inter-organisational information sharing, Bigdeli et al. (2013) divide perceived risks into technological and non-technological risks. Technological risks

represent the threat of introducing and developing new IT systems with the facility of electronic information sharing. The authors also note that the threat could also come from third parties like outsourced IT vendors who could uncover sensitive information during the development and maintenance of information systems in government organisations. On the other hand, non-technological risks include opportunistic information misuse by other participating organisations or individuals, the leaking and spreading of private and sensitive information, or the risk of blame and scrutiny of organisation staff in case of faults or security breaches. Welch et al. (2016) also add that data sharing is vulnerable to possible or actual risks, including loss of control over data, misuse of sensitive data and privacy issues, which possibly reduce organisations' willingness to share data.

Dawes et al. (2009) state that the competitive and political environment surrounding public organisations may influence a risk-averse attitude, and that their willingness to share knowledge is likely to be reduced or to threaten their discretion and autonomy. Dawes (1996) notes that disclosing information to others may expose organisations to the risk of embarrassment or penalties or encourage undesirable comparisons between organisations.

The risk perceived may also increase, which could inhibit data sharing if the expected benefits of data or knowledge sharing are not clearly identified. Therefore, Dawes et al. (2009) suggest that risk management strategies are essential to analyse all the different situations of perceived risks and maintain successful inter-organisational collaboration. Dawes (1996) suggests that a balance between the two principles of information policy, which are information stewardship and information usefulness, is extremely important for the success of inter-organisational information sharing. In this sense, Yang et al. (2014) state that the stewardship principle is expected to promote trust, reduce risk, and ensure the quality of information, while the principle of usefulness will improve the public interest and foster innovation by facilitating the use of information. Furthermore, the researchers note that the two information policy principles should mutually consolidate, and thus reinforce, the benefits and mitigate the risks of inter-organisational public sector information sharing.

3.2.3. Technological Factors

Technological factors are those related to technological artefacts like hardware, software and supporting infrastructure. They can originate from inside organisations, within an inter-organisational level or from the external environment in which the technical solution operates. Technological readiness and data management are the two factors that are thought to be influential in e-Government implementation in the context of this research. A description of these two factors follows.

3.2.3.1. Technological Readiness

ICT is a core constituent and a key enabler of e-Government. As discussed previously in this research, the e-Government system can be viewed as a collection of information systems working and collaborating to deliver public or administrative services (Heeks, 2006). These services are backed by business processes operating inside a single organisation or spanning across multiple organisations. To work effectively, business processes must be supported by an efficient technological environment. This technological environment comprises mainly interoperable technological artefacts, which include software and hardware components that are managed and controlled by skilled and knowledgeable human resources. To this end, researchers have identified and viewed this technological environment in different ways. For instance, Heeks (2006) defines technology in organisations as mainly digital IT that can further cover other information processing technologies including papers and telephony. Bigdeli et al. (2013) and Kamal et al. (2015) broadly describe the technology in the organisational context as the technological environment, or context, that consists of internal and external technological artefacts that support an organisation's processes. They also describe IT capability as the collective view of IT infrastructure, IT sophistication, and staff IT knowledge. However, Gil-Garcia and Sigit (2016), and Pardo et al. (2012) use the term 'technological readiness' to identify the technological environment. Gil-Garcia and Sigit (2016) indicate that technological readiness can mean various aspects, but primarily, it involves the availability of technical infrastructure, interoperable standards, and technological compatibility. They note that the performance of inter-organisational information sharing initiatives is significantly affected by technological compatibility and interoperability. According to the researchers, the incompatibility among technical resources of participating organisations represents a major problem in the e-Government context. In this respect,

Pardo et al. (2012) identify that technological readiness has four dimensions, which are a secure environment, technology acceptance, technology knowledge, and technology compatibility. These dimensions exemplify the appropriate IT environment in which data can be effectively shared through interoperable and secure IT infrastructure, while having knowledgeable and skilled human resources who can manage and maintain this environment, promote data sharing culture, and embrace the technological change. Yang and Wu (2014), and Yang and Maxwell (2011) also argue that the respective technological capabilities of the organisations participating in an e-Government initiative are critical to ensuring that information from providers to receivers can be transferred fluently.

In the context of this research, the technological environment is referred to as 'technological readiness' following Gil-Garcia and Sigit (2016), and Pardo et al.'s (2012) identification, presuming that e-Government implementation and operations require the ultimate level of technological capability. Therefore, based on the relevant literature, the researcher subdivides the technological readiness factor into two sub-factors. They are technical capacity, and IT infrastructure and interoperability. A description of these sub-factors follows.

- **Technical Capacity**

Pardo et al. (2012) conceptualise technical capacity as the existence of adequate numbers of human resources with training and experience related to the implementation of ICT solutions. According to Welch et al. (2016), the technical capacity of an organisation concerns technical skills, absorption ability, employees, and management awareness, and also measures an organisation's preparedness to use innovations for organisational IT work, including the ability to develop regulations and policies for general ICT implementation and adoption. It also captures existing and emerging technology knowledge, including professional qualifications and experience (Bigdeli et al., 2013; Pardo et al., 2012).

In the context of e-Government, Heeks (2006) maintains that technical capacity includes the number of staff involved in the e-Government system and their capabilities. These staff, as STS design suggests, should possess multiple skills to be able to deal with different work situations and unexpected circumstances (Mumford, 2006). Multiple human-resources skills are required to evaluate, plan, install,

implement and maintain ICT infrastructure, and develop and support online e-Services (Hellman, 2010; Melitski, Carrizales, Manoharan, & Holzer, 2011). A lack of technical human capacity can hinder e-Government implementation and inter-organisational information sharing initiatives (Glyptis et al., 2020; Yang & Maxwell, 2011). Due to limited resources, an organisation may focus on urgent issues within its own business when the immediate benefits of information sharing cannot be predicted (Dawes & Zhang, 2006; Landsbergen Jr. & Wolken Jr., 2001).

In the same vein, it has been argued that technical capacity is a critical success factor in e-Government implementation efforts (Gil-Garcia, 2012; Welch et al., 2016; Yang & Wu, 2014). Other researchers have noted that technical capacity is closely interrelated with e-Government implementation (Ebrahim & Irani, 2005; Pardo et al., 2012; Welch et al., 2016). Whereas, that lack of technical capacity in organisations is a key barrier to the success of e-Government and data sharing initiatives (Gil-Garcia, 2012; Yang & Wu, 2014). For instance, Yang and Wu's (2014) findings indicate that the availability of qualified IT professionals reinforces the technical capabilities of organisations, increases their willingness to collaborate with other organisations, and promotes a culture of positive data sharing attitudes. In contrast, they note that a scarcity of IT professionals or IT knowledge makes organisations reluctant to adopt electronic solutions and would end up following outdated paper-based approaches. Similarly, Bigdeli et al. (2013) and Kamal et al. (2015) confirm that organisations with advanced IT resources have a higher-level of technological readiness and are more willing to engage in e-Government projects or data sharing initiatives. Meanwhile, the lack of IT knowledge at senior management levels can block innovation, discourage technology acceptance, and lead to resistance-to-change (Janssen & Cresswell, 2005).

According to Gil-Garcia and Sigit (2016), earlier studies have acknowledged the importance of external consultants' involvement in IT projects to cover the skills gap. Pardo et al. (2009) note that the involvement of external consultants also represents one of the main factors affecting information sharing between public organisations. In this sense, Njihia and Merali (2013) advocate the need to use external consultants for ICT public sector projects, in particular to ensure the potentially disruptive effect of technological innovations is managed and to draw attention to new ideas concerning the organisational change aspects of structure and culture. For example, in the case of the implementation of e-Service delivery in Qatar, external consultants assisted the

project team when there was not enough expertise in the country (Gil-Garcia & Sigit, 2016).

- **IT Infrastructure and Interoperability**

e-Government implementation requires a complex network of information systems and sophisticated telecommunication technologies. This, in turn, necessitates a sufficient level of a sustainable IT infrastructure that can effectively support inter-organisational collaboration and data sharing. However, to enable integrated and seamless interoperable collaborations, an IT infrastructure must be carefully planned, maintained and supported by adequate financial resources and qualified personnel with comprehensive IT knowledge (Kamal et al., 2015). The absence of adequate IT infrastructure in public organisations has been identified as a barrier to e-Government implementation (Bigdeli et al., 2013; Glyptis et al., 2020; Kamal et al., 2015), which, in turn, disrupts information system interoperability and the delivery of e-Services.

Archmann and Kudlacek (as cited in Bigdeli et al., 2013) define information systems interoperability as the mechanism of communicating and exchanging data meaningfully, between disparate information systems, based on common and established standards. Information systems interoperability is considered to be a key factor facilitating inter-organisational data sharing (Pardo et al., 2012; Yang et al., 2014).

Bigdeli et al. (2013) state that one of the key steps to improving the sharing of information and the integration of business processes in the public sector is to identify the interoperability standards to be applied to the various information systems implemented across organisations. Researchers indicate that interoperable system architecture represents a core component of e-Government and, particularly, inter-organisational information sharing (Gil-Garcia et al., 2010; Scholl & Klischewski, 2007; Yang et al., 2014).

Yang and Wu (2014), and Glyptis et al. (2020) note that issues of integration and data sharing in e-Government can occur when participating organisations use various types of information systems and technology standards. In addition, it has been argued in the literature that integrating heterogeneous information systems having diverse technical platforms and data standards is a key challenge in successful e-Government implementation (Dawes & Zhang, 2006; Glyptis et al., 2020; Klischewski & Scholl,

2008; Lam, 2005; Yang & Wu, 2014). Lam (2005) asserts that differences in the interoperability of information systems' architecture are the main reason for unsuccessful integration in e-Government implementation. Research findings indicate that architecture interoperability challenges include incompatible network infrastructure (Pardo & Tayi, 2007), the use of various technology platforms (Gil-Garcia, 2012; Lam, 2005; Pardo et al., 2012; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Yang & Maxwell, 2011), the use of proprietary technologies, a 'closed' design of existing applications (Lam, 2005), insufficient network capabilities (Irani, Themistocleous, & Love, 2003; Scholl, 2005; Scholl & Klischewski, 2007), a lack of standard APIs (Algemili, 2016; Lam, 2005), incompatible data standards (Yang & Maxwell, 2011), and discrepancies in application development frameworks and software development methodologies (Lam, 2005). In addition, Lam (2005) notes that even when the same technical standards are common among government organisations, interoperability issues can result from incompatible versions of the technology.

Furthermore, Yang and Maxwell (2011) point out that information systems outsourcing, in both the public and the private sectors, poses challenges in information systems interoperability across participating organisations. They state that systems design and requirements specifications may not be well documented and maintained, contractors may compete with one another, and certain contractors may be out of business and may fail to support the information systems.

Various approaches have been suggested to alleviate information systems interoperability issues. In the literature, researchers have argued that the development of standards, platforms and application metadata, and the use of algorithms to bridge disparate and heterogeneous information systems are essential for effective e-Government service delivery and seamless inter-organisational data flow (Gil-Garcia & Pardo, 2005; Gil-Garcia & Sigit, 2016; Lam, 2005; Pardo et al., 2004; Pardo & Tayi, 2007; Scholl & Klischewski, 2007; Schooley & Horan, 2007; Yang & Wu, 2014).

In the same respect, researchers have also noted that approaches like XML, web services, and service-oriented architecture (SOA) are commonly used for information exchange in heterogeneous databases with various data structures and definitions (Yang & Maxwell, 2011; Yang & Wu, 2014).

Pardo et al. (2012) maintain that developing policies and procedures for the selection and inclusion of appropriate standards can largely enhance interoperability. The authors also emphasise that developing government-level enterprise architecture is critical for aligning information systems with business processes across public sector organisations for the facilitation of greater interoperability.

At the international level, some governments have already addressed the issue of the interoperability of systems architecture (Lam, 2005). For example, the European Commission's framework for Pan-European e-Government services (European Commission, 2004) identifies three dimensions of information systems interoperability standards: front-office issues, such as access; back-office issues, such as integration and architecture, and common concerns of security (Pardo et al., 2012). The Australian government offers six domains of information systems interoperability, which are security, interconnection, data exchange, discovery, presentation, and metadata (Australian Government, 2005). Similarly, in the UK, the e-Government Interoperability Framework (e-GIF) has been set up to specify the national interoperability standards, and in Italy, the Italian government's Authority of Information Technology in the Public Administration (AIPA) has developed the framework of 'reference cooperative architecture' standards (Lam, 2005).

3.2.3.2. Data Management

According to Dawes (2009), the data management domain covers a variety of issues, concepts, tools, and practices. Dawes notes that concepts such as metadata are concerned with data standardisation, quality, and integrity of information. The researcher adds that while some data management concepts deal with data sources such as electronic archives and digital libraries, other concepts also focus on tools for accessing, using, analysing, and safeguarding, such as search and retrieval, ontologies, knowledge management, and information security and privacy. Based on this, we classify the data management factor into two key sub-factors which are data quality and standards, and data security and privacy, as detailed below.

• Data Quality and Standards

Data standards in e-Government are an important aspect for facilitating data sharing and integration among the participating organisations. To achieve data standardisation, Yang and Wu (2016) contend that government organisations are

anticipated to follow standards from the metadata scheme, API design specifications and open data services. The researchers indicate that datasets of the open data platforms may also be used to integrate with other datasets to feed in the transactions of e-Government services, as well as to enhance the performance of the internal operations. Data incompatibility standards are considered to be a potential barrier to e-Government integration (Lam, 2005).

To this end, Pardo and Burke (2008) suggest that requirements specifications for data standardisation should take into account the extent to which formal data collection, use, storage and management policies are identified and specified. The researchers also suggest including common procedures for data analyses and building standard data models to respond to the issues of data incompatibility among the organisations participating in information sharing initiatives.

Researchers have indicated that the common data standards and quality problems include data incompatibility among information systems (Lam, 2005), conflicting data definitions (e.g., the concept name is represented in multiple forms) (Gil-Garcia, 2012; Lam, 2005), data accuracy, mismatched data structures and incompatible database designs (Gil-Garcia, 2012; Pardo & Tayi, 2007), and variable data quality (Pardo & Tayi, 2007). Gil-Garcia (2012) emphasises that data quality and data accuracy are two important issues, but they are often taken for granted. Lam (2005) suggests the need for standardisation in data formats and the adoption of common data models to overcome such problems. Algemili (2016) reports that the W3C (a group that is interested in e-Government) maintains data standards; however, aspects such as data ownership and data flows are still lacking and require better consideration from e-Government stakeholders.

Researchers argue that data quality is important for inter-organisational data sharing and integration (Algemili, 2016; Bigdeli et al., 2013; Gil-Garcia, 2012; Zhang et al., 2018). Bigdeli et al. (2013) maintain that data quality can improve inter-organisational collaboration and enhance the quality of public service delivery. However, issues in data quality may arise, especially when integrating information sources across several domains of control and quality standards (Dawes, 1996; Scholl & Klischewski, 2007). Algemili (2016) asserts that organisations should improve their data quality to reduce potential failures in integration. Bigdeli et al. (2013) state that information sharing

success between organisations depends heavily on the quality of the information to be shared.

Since data quality is critical in the success of inter-organisational data sharing and integration initiatives, researchers like Bigdeli et al. (2013) suggest building common quality standards that should be defined and referenced across the participating organisations. However, Klischewski and Scholl (2008) contend that building such standards is a complicated task because the requirements of the participating organisations may vary, and also the significance of the data and information can change over time. In the same vein, Dawes et al. (2009) note that high-quality data cannot only be judged by its accuracy and clear content but rather it is judged by its fit for purpose and use, clear visibility and accessibility. They point out that the same information may be ideal for some applications but could totally be inappropriate for others that differ in time, security, granularity or other attributes. They see that technology can support and enhance data quality but it is not enough for absolute success.

Researchers have addressed the importance of data standardisation and accessibility issues such as meaning and semantic mapping while sharing and integrating a large amount of data across organisations from various locations while using the diversity of sources and formats like databases, websites, text documents and images (Pardo et al., 2004; Pardo & Tayi, 2007). Yet, for such standardisation to take effect, there is a need for the development of different technical solutions, such as interoperable APIs, metadata platforms, and the associated software tools and algorithms (Pardo et al., 2004). Moreover, Pardo and Tayi (2007) stress that, regardless of accessibility and data standards, the quality of the integrated data must be ensured across the realm, even when the single data sources prove to be valid. In this respect, the researchers maintain that data quality cannot be evaluated and subsequently enhanced regardless of the source in which the data are generated, processed and used.

- **Data Security and Privacy**

The efficiency of e-Government largely depends on information and data sharing between public organisations. Nevertheless, the sharing of data must be handled in a controlled and open manner that protects sensitive information, as well as the identity of the citizen (Lam, 2005). It has been argued in the literature that data security and

privacy are considered to be a key factor influencing e-Government implementation, and, more specifically, inter-organisational data sharing and integration (Bigdeli et al., 2013; Gil-Garcia & Sigit, 2016; Glyptis et al., 2020; Lam, 2005; Pardo et al., 2012).

The literature has reported several issues regarding data security and privacy. According to Pardo et al. (2012), officials from the public sector who were involved in inter-organisational data sharing initiatives have identified data privacy, disclosure, and confidentiality as significant issues. Lam (2005) states that the differences in the security models used across public information systems and the vagueness in privacy policies between specific government organisations are major obstacles to data sharing in e-Government. Yang and Wu (2016) indicate that security issues may arise from using aged information systems that lack the required security standards, the lack of skilled personnel, and the complexity of data anonymisation algorithms. In addition, researchers like Bigdeli et al. (2013), Gil-Garcia and Sigit (2016), Zhang et al. (2018), and Yang and Wu (2013) argue that the issues of data protection and information security and privacy raise major concerns among citizens and public organisations, which may influence the decision to share data. For instance, Bigdeli et al. (2013) state that such concerns are the results of the challenges faced by governments to protect public data against multiple threats, such as terrorism risks, violence, abuse of children, fraud, etc., which imply significant care is required to protect vulnerable citizens from a decision that could lead to a life or death situation. Likewise, Gil-Garcia and Sigit (2016) note that integrating data and information from various sources may lead to the reidentification of personal data and the invasion of data privacy and security. Bigdeli et al. (2013) have also reported that citizens' perceptions of how public organisations handle and share their personal data is not positive and lacks their trust. According to the authors, a survey of citizen's perceptions across Europe (Eurobarometer, 2008) regarding data privacy has shown that people commonly have low trust and they have been reluctant to share their personal information across the public sector. This result, as indicated by the researchers, has remained largely consistent for nearly 20 years. According to this survey, 64% of EU citizens and 77% of UK citizens are in doubt over whether their personal information has been handled securely (Bigdeli et al., 2013).

Therefore, public concerns regarding citizens' data privacy, including why data are collected, with whom it is going to be shared and how it is going to be used,

disseminated and stored, call for practical security policies (Lam, 2005; Yang et al., 2014). In this respect, researchers, however, have indicated the lack of policies and legislation to enforce the privacy and confidentiality of the shared data and information (e.g., Dawes & Zhang, 2006; Landsbergen Jr. & Wolken Jr., 2001; Yang et al., 2014). Conversely, other researchers have pointed out that inter-organisations data sharing can be hindered by some strict legislation that prevents public organisations from sharing sensitive data (Dawes, 1996; Gil-Garcia & Pardo, 2005; Wenjing, 2011; Yang et al., 2014).

Hence, to mitigate data security and privacy threats, Yang et al. (2014) believe that an effective privacy policy that protects personal information and relieves public concerns by raising their trust in e-Government transactions is necessary. Moreover, Yang and Wu (2016) suggest that organisations should look forward to applying advanced security techniques of data anonymisation to protect against opportunistic data re-identification.

3.3. Summary

The purpose of this chapter was to provide the conceptual framework that combines the factors affecting e-Government implementation guided by STS theory and the relevant literature. The extensive survey of prior relevant studies has identified a set of influential factors and provided a comprehensive understanding of their effect on such implementation. These factors have been classified into key factors (eight factors) and sub-factors (23 sub-factors). In turn, those key factors have been categorised into three dimensions (environmental, organisational, and technological), each comprising a set of main and sub-factors. The resultant themes and main factors are environmental (pressure forces, policies and legislation), organisational (managerial capability, structure and culture, facilitating conditions, attitude and behaviour) and technological (technological readiness, data management).

After presenting and discussing the conceptual framework of this research, the thesis proceeds to discuss the research methodology adopted for the empirical fieldwork, detailing, and justifying the research approach, as well as describing the data collection and data analysis processes.

CHAPTER 4: Research Methodology

4.1. Introduction

In the previous chapter, the conceptual framework for e-Government implementation was proposed and described. This chapter explains how this research was carried out to answer the research question and achieve the research objectives.

In doing so, this chapter defines and discusses the research philosophy that this study follows in Section 4.2, then outlines the chosen methodological approach in Section 4.3 and the research strategy used to conduct the fieldwork to collect data from three Omani public organisations in Section 4.4. The chapter then presents the research design in Section 4.5, laying out the systematic flow of the research, including the case study protocol and data collection and analytical processes. Section 4.6 presents the ethical code of conduct followed during data collection and analysis. Finally, the chapter concludes with a summary in Section 4.7.

4.2. Research Philosophy

Scholars have indicated that four interdependent aspects of research must be addressed throughout any research process: philosophy; epistemology; methodology; and method (Bell, Bryman & Harley, 2018; Benbasat, Goldstein & Mead, 1987; Myers & Avison, 2002; Saunders, Lewis & Thornhill, 2009). Research philosophy (also known as the research paradigm) is the theoretical perspective that denotes “how the individual makes sense of the world” (Joseph, 2013, p. 437). The theory of knowledge embedded in this theoretical perspective is termed *epistemology*, which undergirds the assumptions made about knowledge and dictates how it can be sought (Crotty, 1998; Myers, 1997, 2019). Epistemology also influences the selection of research methodology (Myers, 2019). The term *methodology* refers to the “theory of how research should be undertaken” (Saunders et al., 2009, p. 3). It is a wider, more comprehensive framework describing both the overall approach and the reasons underlying method selection (Joseph, 2013), while the *method* is the collective set of techniques, procedures and instruments used to collect and analyse data (Saunders et al., 2009). The selection of a research method is driven largely by a collection of research questions or hypotheses (Crotty, 1998; Joseph, 2013).

In social science research, researchers have identified several philosophical paradigms – including positivism, interpretivism, critical (Crotty, 1998; Guba & Lincoln, 1994), post-positivism (Guba & Lincoln, 1994), feminism and post-modernism (Crotty, 1998). However, the literature has indicated that positivism and interpretivism have been dominant in information systems research (Joseph, 2013), with positivism in particular being the primary philosophical approach (Chen & Hirschheim, 2004; Maimbo & Pervan, 2005). As both seek to improve the shared view of the world, the positivist approach is associated more strongly with the use of experiments and survey methods, whereas the interpretive approach tends to be used with case study methods, ethnography and phenomenography (Weber, 2004). Furthermore, Myers (1997, 2019) noted that the critical paradigm can be used in place of the previous two, particularly with case study research methods. However, Joseph (2013) asserted that these three paradigms are not always distinguishable in social science research, and that whether they can be employed together in a single study remains uncertain.

In the field of e-Government, Omar, Weerakkody and Daowd (2020) asserted that e-Government research over the past two decades has used various methodological perspectives that have provided observations and realistic guidance while failing to establish a specific frame of reference. Nevertheless, e-Government research is interdisciplinary, combining domains such as information systems, public administration and management (Gunawong & Gao, 2017; Joseph, 2013; Yildiz, 2007). Each of these disciplines offers rich knowledge of methodological perspectives and, therefore, the typical research methods applied through them can be used to examine e-Government. In particular, information systems research has dominated the theorisation of the e-Government concept (Dwivedi, 2009). In this respect, researchers have indicated that the research paradigms positivism, interpretivism, descriptivism (Dwivedi, 2009), inductivism and constructivism (Omar et al., 2020) have been the most commonly used to study e-Government.

It follows from this that the three philosophical perspectives discussed above (i.e., positivist, critical and interpretive) can be used in e-Government research and, therefore, are described further below, including descriptions of these paradigms, while justifying the epistemological approach used in this study that best fits the context of investigation and addresses the research inquiry.

4.2.1. Positivist Paradigm

Positivists typically believe that truth exists objectively and can be defined using measurable mechanisms independent of the observer (Myers, 1997). The main characteristic of positivism is that the world is ordered and rationally viewed.

Positivist studies, in the general sense, tend to test a theory to gain predictive insights into certain phenomena (Myers, 1997). Positivist concepts emphasise the use of random sampling methods, quantifying the outcome and the development of predictive causal models (Myers & Avison, 2002).

Information systems research may be categorised as positivist if it comprises formal hypotheses, quantifiable measurements of variables, hypothesis testing and inferences from the sample to the specified population about a phenomenon (Klein & Myers, 1999; Myers, 1997; Orlikowski & Baroudi, 1991). However, the positivist paradigm has been criticised for its shortcomings in interacting with people and incorporating their views, and is viewed as too subjective (Bell et al., 2018).

4.2.2. Critical Paradigm

Critical paradigms seek to question the current state of reality by revealing what is perceived to be rooted deeply in social systems, thereby changing certain restrictive social conditions (Orlikowski & Baroudi, 1991). The critical paradigm, as described by Myers (1997), is the philosophical view in which critical researchers believe that social reality is constructed historically, being produced and reproduced by people. Myers points out that although people actively may seek to alter their social and economic conditions, critical researchers acknowledge that their capacity to do so is restricted by various forms of social, cultural and political dominance, as well as by natural laws and resource constraints (Klein & Myers, 1999; Myers, 2019).

Research can be viewed as critical if its primary goal is a social critique, exposing the limiting and alienating conditions of the status quo (Kihlstrom & Klein, 1994; Myers, 2019). This is in line with Orlikowski and Baroudi (1991, p. 6), who argued that research is classified as critical if it presents “evidence of a critical stance towards taken-for-granted assumptions about organisations and information systems, and a dialectical analysis that attempted to reveal the historical, ideological and contradictory nature of existing social practices”.

4.2.3. Interpretive Paradigm

Interpretive researchers assume that truth can be accessed only through social constructions of peoples' language, perceptions and shared meanings (Myers, 1997, 2019; Walsham, 1995b), prioritising the genuine reflection of people's opinions and lived experiences (Volmar & Eisenhardt, 2020). In the interpretive paradigm, the meanings that people use to describe a social phenomenon help in understanding such a phenomenon (Myers, 1997). Interpretive researchers do not claim that they report facts, but rather express their interpretations of participants' interpretations (Walsham, 1995a). Interpretive research does not predefine dependent and independent variables, but rather focusses on the entire complexity of human sense-making as the situation emerges (Klein & Myers, 1999; Myers, 1997, 2019). Interpretive researchers are committed to understanding a phenomenon within its social context, in which the phenomenon under study is investigated in its natural setting, from the participants' perspective, in which the researchers do not impose *a priori* conceptions or expectations on the situation (Orlikowski & Baroudi, 1991). Nevertheless, IS researchers have used theoretical frameworks to guide research design, as well as data collection and analysis (Orlikowski, 1989; Walsham, 1995a; Walsham & Waema, 1994).

Interpretive studies mainly intend to examine constructs, such as identity and sense-giving, and rely more on socially developed perceptions of a particular phenomenon and less on the generalisation of theory (Volmar & Eisenhardt, 2020). That is, generalisations of populations made from field sites' settings are not sought; the aim instead is to understand a phenomenon's deeper structure, which then can be used to inform another phenomenon in a similar context (Orlikowski & Baroudi, 1991).

Interpretive researchers view organisations as dynamic entities in which the relationship among people, organisations and technology is ever-changing, i.e., interpretive research seeks to understand a moving target (Klein & Myers, 1999). Concerning information systems, Myers (1997, 2019) asserted that information systems interact with the contexts in which they operate, whereby interpretive methods attempt to understand this interaction. Therefore, interpretive research enables information systems researchers to understand human thinking and practice in social and organisational contexts (Klein & Myers, 1999).

In using the interpretive paradigm, Klein and Myers (1999) recommended that clear attention must be given to understanding the concept of interpretivism and justifying its use. They pointed out that no clear distinction has been made between qualitative and interpretive approaches, noting that the latter may not be used as a substitute for the former. Nevertheless, Klein and Myers (1999), and Myers (1997, 2019) argued that qualitative research may or may not be interpretive, depending on the researcher's underlying philosophical assumptions. Research can be categorised as interpretive if it is believed that our understanding of reality is obtained only through socially constructed elements, including language, realisations, shared meanings, documents and tools (Klein & Myers, 1999; Myers, 1997, 2019).

4.2.4. Selection and Justification of the Research Philosophy

This research adopts an interpretive approach, following Orlikowski (1989), and Walsham and Waema (1994). Orlikowski (1989) studied how the introduction of computer-aided software engineering (CASE) tools in systems development has changed social relations among project team members, while Walsham and Waema (1994) analysed a case study of strategy formation and implementation within a medium-size UK organisation. In both studies, the researchers developed a theoretical framework upfront to guide their empirical research. The theoretical framework "takes account of previous knowledge, which creates a sensible theoretical basis to inform the topics and approach of the early empirical work" (Walsham, 1995a, p. 76). The same is followed in this research, in which the conceptual framework's key role primarily is to guide the empirical study. First, an effort has been made to ensure that a clear understanding exists of how STS can be expressed more clearly in more detail. Second, the framework is organised so that it can devise the field study to be as informing and informative as possible.

Based on this, the researcher argues that in the present study, the interpretive approach is viewed as an appropriate underlying research philosophy for investigating the implications of socio-technical factors' interactions for e-Government implementation and its success. This selection is justified further as follows:

- e-Government is a complex social phenomenon comprising multiple stakeholders that needs to be viewed holistically to understand the problems facing organisations, projects, and people. Thus, the interpretive approach

helped the researcher understand the phenomenon from participants' voices using face-to-face interviews, thereby getting close to them, and examining the challenges related to e-Government implementation. The approach allowed the researcher to discuss related issues in detail with the participants and interpret their 'shared' meanings (Myers, 1997; Walsham, 1995b).

- Organisational and technological factors are related to this investigation, and these factors interact together in a dynamic way (Klein & Myers, 1999; Myers, 1997) that this study seeks to investigate, whereby interpretive methods attempt to understand such interactions in a more subjective manner.
- The research presented herein is not based on quantifiable measures of variables, nor on testing hypotheses, so the positivism approach cannot support it. Simultaneously, the study did not intend to take a critical stance towards taken-for-granted assumptions about e-Government systems to reveal the historical, ideological and contradictory nature of existing social practices (Orlikowski & Baroudi, 1991). Thus, the critical approach as well is not the right fit, while the interpretive approach suits the line of inquiry in this research, which sought to answer the 'what' and 'how' questions (as presented in Chapter 1, Section 1.5).

Therefore, an interpretivist approach is ideal for understanding e-Government implementation and addressing the inquiries and issues of this research in particular.

Having decided on the most appropriate research philosophy for this study, the next section discusses the most suitable methodological research approach for answering the research inquiry. The research method chosen is secondary to the adoption of a philosophical approach (Guba & Lincoln, 1994).

4.3. Research Approach

Choosing a suitable research approach is a key aspect of the research design process (Walsham, 1995b). Considering that a broad range of theoretical perspectives underlies information systems (Orlikowski & Baroudi, 1991), and that each perspective has its own strengths and weaknesses, it is critical that the most suitable

approach is employed – one that fits the investigative context of the phenomenon under study.

The research approach commonly is categorised as either quantitative or qualitative (Zobel, Gruba & Evans, 2014), while the mixed-methods approach combines both. However, considering that a single research approach was adopted for this study (as justified below in Sub-section 4.3.3), a review of the quantitative and qualitative approaches is provided here, along with the key differences between them.

To this end, Joseph (2013) stated that the quantitative-qualitative debate always is involved in every research argument. Crotty (1998) argued that the distinction between the two approaches does not occur at the epistemological or theoretical levels, but rather at the methodological level. Furthermore, researchers have indicated that quantitative research originates from a deductive, positivist stance (Joseph, 2013; Omar et al., 2020), while qualitative research follows an inductive orientation based on epistemological inductivism (Omar et al., 2020), constructivism (Joseph, 2013; Omar et al., 2020) and ontological subjectivism (Omar et al., 2020; Wirtz & Daiser, 2018). Drawing on this, it can be argued that the key distinction between quantitative and qualitative research is the type of questions and unit of analysis employed, as well as the nature of the researcher's involvement.

Past e-Government research has used both quantitative and qualitative approaches. In a recent methodical review of e-Government research that included 496 papers from 1979 to 2017, Omar et al. (2020) found that past e-Government studies used both approaches. Omar et al.'s systematic review indicated that qualitative studies notably were preferred over quantitative studies, but that the qualitative methods used in e-Government research commonly were descriptive in nature, drawing on weak causal data. However, researchers such as Wirtz and Daiser (2018), and Alcaide–Muñoz, Rodríguez–Bolívar, Cobo and Herrera–Viedma (2017) advocated for quantitative over qualitative methods for e-Government theory development. Nevertheless, Omar et al. (2020) asserted that qualitative approaches offer rich knowledge and more powerful insights when used with rigour.

Below, a description of both quantitative and qualitative methodological approaches is provided.

4.3.1. Quantitative Approach

Quantitative methods originally were introduced to study natural phenomena in natural science research (Saunders et al., 2009), used mainly to test theories by examining the relationship between variables through the collection of numerical data and analysing these data statistically (Creswell, 2013). The main feature of quantitative research is that it emphasises the use of measures to generate and test operational terms, usually referred to as ‘hypotheses’ (Bell et al., 2018). These measures represent values and levels of theoretical constructs and concepts that can be viewed as reliable scientific evidence to explain or predict phenomena that occur in the real world (Creswell, 2013). In particular, quantitative researchers generate and test hypotheses using quantitative methods such as surveys, laboratory experiments, simulations, mathematical modelling and econometrics (Myers, 1997; Myers & Avison, 2002; Saunders et al., 2009).

Quantitative research is correlated more with advantages that are better suited to testing theories, seeking generalisations or replicating findings (Creswell, 2013), and is less prone to subjectivity than qualitative research (Omar et al., 2020). However, researchers have argued that some disadvantages are associated with quantitative approaches. For example, Omar et al. (2020) indicated that the quantification of social phenomena, such as e-Government, may require complex conceptualisation and operationalisation processes that entail possible drawbacks. Likewise, Wirtz and Daiser (2018) pointed out other disadvantages in some instances in which the wrong sample sizes may disallow generalisation of findings, respondents may provide biased data, variables are influenced by unmeasurable variables and scaling of data leads to distortions.

4.3.2. Qualitative Approach

Unlike the quantitative approach, qualitative research is based on text and visual aids rather than numbers (Miles & Huberman, 1994). It has unique steps in data analysis and draws on diverse designs. Qualitative research “intends to understand a particular social situation, event, role, group or interaction” (Creswell, 2013, p. 255). Qualitative researchers tend to include multiple perspectives and identify various aspects involved in creating a holistic view of the topic under investigation (Creswell, 2013). As stated by Strauss and Corbin (1998), qualitative approaches may be used to investigate areas

of interest about which little is known, or about which much is known, but to obtain better in-depth insights and collect intangible details about a phenomenon – such as feelings, thought processes and emotions – that are difficult to extract using other approaches, e.g., the quantitative approach.

According to Myers (1997), qualitative research can accommodate different research paradigms. For example, Guba and Lincoln (1994) suggested that four research paradigms – positivism, post-positivism, critical and constructivism – could be used in qualitative research, while Orlikowski and Baroudi (1991) suggested three, which Myers also recommends adopting in qualitative research: positivist; interpretive; and critical (Klein & Myers, 1999; Myers, 1997; Orlikowski & Baroudi, 1991). However, Creswell (2013) argues that qualitative research is interpretative research in which the researcher is involved closely and intensively with participants.

However, the intent of qualitative research, as noted by Creswell (2013), is not to generalise findings entirely, but rather the descriptions and themes developed in a specific context. However, Yin (2014) asserted that findings from qualitative studies, mainly in case study research, can be generalised to some broader theory, which often occurs when studying additional cases and replicating findings to new cases.

Research methods that can be used in qualitative research include case study, grounded theory, ethnography and action research (Myers, 1997). Qualitative researchers aim to collect data through various means, including interviews, observations, documents and audio-visual data (Creswell, 2013).

In the field of e-Government, Omar et al. (2020) called for more and continuous qualitative research to nurture e-Government's theoretical perspectives and facilitate the development of new theoretical lenses, considering that the theories being used so far have been borrowed from other research areas. Although quantitative research advocates encourage adopting quantitative research to study e-Government, Omar et al. (2020) argued that quantitative methods limit research contributions because quantitative methods' focus is constrained mainly to falsifying theories.

Like quantitative research, qualitative research also has its own limitations. In this respect, Miles and Huberman (1994) indicated that qualitative data has certain somewhat-problematic features that distinguish it from quantitative data, including

textual richness and significance that can be lost during the process of analysis, data reduction or interpretation.

After reviewing the two research approaches most commonly used in social science and information system studies, the next sub-section argues that the qualitative approach better fits this study's context and suits its line of inquiry.

4.3.3. Justifying Adoption of the Qualitative Research Approach

The present study adopted the qualitative research approach, as it was found to be most suitable for several reasons:

- Considering that the present study aims to investigate the implications from socio-technical factors' interactions for e-Government implementation, the qualitative research method was chosen because it could elicit insights regarding the nature and particularities of this subject matter, as well as address STS aspects and issues to reduce the risk of e-Government implementation failure.
- The researcher is not overly concerned with objective truth, but rather with reality as participants perceive it. Thus, the qualitative research approach facilitated the generation of soft, rich contextual data associated with human and organisational issues.
- The qualitative research method allowed the researcher to examine in-depth implementation issues concerning less acknowledged and complex phenomena, such as e-Government, in less-documented and -published literature contexts, such as Oman. This also afforded the researcher considerable flexibility during the interviews, allowing him to study e-Government in a natural setting and learn from practice.

Therefore, the researcher contends that the qualitative approach was the right fit to conduct this research.

Based on the research philosophies and approaches presented up to this point, and the selection of the appropriate methodological combination (i.e., qualitative interpretive research), the next section discusses the selection of an appropriate research strategy for this study.

4.4. Research Strategy

Different research strategy methods associated with qualitative research can be employed to accomplish fieldwork. The selection of a particular strategy mainly depends on the particular study's objectives and the types of research questions asked (Creswell, 2013). According to Yin (2012), three criteria must be met in contrasting research strategies and selecting from among them: the type of research questions; the degree of the investigator's control over actual behavioural events; and the degree of focus on contemporary issues vs. historical events.

Researchers recommend five types of strategies for qualitative studies: narrative; phenomenological; ethnographic; case study; and grounded theory (Creswell, 2013; Saunders et al., 2009). However, in information systems research, the most commonly adopted strategies are case study, ethnographic, grounded theory and action research (Myers, 1997; Walsham, 2006).

Nevertheless, this study does not intend to present a full review of these qualitative research strategies, but rather to focus on case study (Yin, 2014) as the most suitable strategy for this particular research while offering proper justifications.

4.4.1. Case Study Strategy

Yin (2014, p. 16) defined *case study* as 'an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, particularly when the boundaries between phenomenon and context may not be clearly evident'. Yin suggested that a case study involves intensive analysis of a phenomenon in its natural setting using various data collection techniques – such as interviews, observations, and questionnaires – from multiple data sources (e.g., individuals, groups, and organisations). A case study is a commonly used research strategy in situations in which the study's purpose and objectives are to find answers to questions regarding 'Why?', 'How'? or 'What?' and often is used in explanatory and exploratory research to study a programme, event, activity or process in depth (Saunders et al., 2009). It does not require experimental control groups or statistical analysis, considering that findings are obtained directly from participants' experiences (Benbasat et al., 1987). According to Volmar and Eisenhardt (2020), case study research has a long tradition within organisational studies, strategy management, and

social sciences, and continues to be a focal methodological approach in contemporary research.

With respect to information systems research, researchers like Klein and Myers (1999), and Benbasat et al. (1987) have argued that the case study strategy is an acceptable and valid approach in this regard. For instance, Benbasat et al. (1987) noted three important advantages that make the case study strategy ideal for information systems research: First, it is a desirable method that could be used effectively to capture the practical experience of information systems practitioners to develop theories from practice. Second, the shift from a technological focus to an organisational focus perspective in the field has created more venues in which to study the context and its interaction with technology. Third, the use of case study research seems appropriate amid the rapid and emergent changes occurring in the field. In line with this, Volmar and Eisenhardt (2020) asserted that case study research is appropriate for addressing the holistic view and issues to identify theoretical gaps, particularly when current theory is inadequate, unlikely to be correct, conflicted or simply does not exist.

Besides theory building, case studies also can be used for theory testing. According to Volmar and Eisenhardt (2020), theory testing addresses incremental gaps, while the theory-building approach is more effective in addressing large gaps. The researchers propose that theory building, in particular, can be established by analysing single or multiple cases to discover common themes emerging from the data to obtain theoretical insights in the form of constructs and theoretical relationships among those constructs or propositions.

One of the main strengths of the case research method is the flexibility and ability to adapt, which allows for the use of single or multiple methods to examine a particular research problem (Cavaye, 1996). However, limitations associated with this type of research also exist, including complexities in managing case studies, in which getting access to case study sites can be difficult and sometimes even impossible, as many organisations are reluctant and unwilling to be investigated as part of research (Walsham, 2006).

Finally, to adopt a case study, Yin (2014) emphasised that the researcher, at the outset, should specify research questions and conduct fieldwork according to a study plan (or a case study protocol). Case study protocol is described further in Sub-section 4.5.1.1.

4.4.2. Types of Case Studies

As suggested by Yin (2014), three types of case studies exist – exploratory, descriptive and explanatory – each of which depends on the research question(s) to be answered (i.e., ‘how’, ‘why’ and ‘what’).

An exploratory study is a way to figure out ‘what’ is going on, look for potential insights, ask questions and examine phenomena using a different perspective (Saunders et al., 2009). It seeks to develop explanations to social phenomena without *a priori* assumptions (Snead & Wright, 2014). Exploratory research usually is used to clarify an incident and suggest or devise new guidelines or a model for examining a phenomenon in its natural setting (Saunders et al., 2009; Yin, 2014). According to Saunders et al. (2009), exploratory case studies can involve a literature review or discussions and interviews with experts or people with knowledge of the environment in which a phenomenon exists. Furthermore, the researchers add that observation and documentary analysis also can be used for data collection in an exploratory case study.

However, explanatory research aims to establish causal relationships between constructs to explain how events occur or how participants experience them (Hearne, King, Geary & Kenny, 2018). It often is used in quantitative studies in which data are analysed through statistical tests, such as correlations (Saunders et al., 2009). Explanatory research answers ‘why’ questions (Snead & Wright, 2014) in which each explanation is intermediate and contains elements that need to be explained (Miles & Huberman, 1994). To carry out an explanatory study, Saunders et al. (2009) suggested that a theory, along with a theoretical model of variables and their relationships to be tested, needs to be predefined from extant literature using a quantitative-type data collection instrument, such as a survey questionnaire.

Finally, descriptive case studies describe events or conditions that have arisen and, therefore, have more to do with particular cases, such as organisational or individual profiling (Saunders et al., 2009). Descriptive research seeks to address questions such

as ‘what, when, where or how’ and tries to describe what exists or what is happening (Snead & Wright, 2014).

Based on the above classification, the case study followed in this research can be classified as exploratory. This study aims to investigate (or explore) the effects from socio-technical factors on the process of e-Government implementation through an STS theoretical lens while attempting to extend the application of the theory and inform it from the findings. Moreover, the type of the investigation in this study is associated with an interpretive qualitative research approach. Exploratory case studies, as presented in this research, are useful for theory building and valuable in developing propositions for further considerations. As Evans et al. (2014, p. 88) articulated, ‘A case study is, in a sense, a preliminary investigation that seeks to establish an agenda for further research’.

4.4.3. Single Case vs. Multiple Cases

Case studies can be single or multiple, and a key factor for case study design is the decision on whether to examine one or many cases (Yin, 2014). Deciding on the number of cases largely depends on whether the researcher can grasp and describe the context of the phenomenon under study to a degree that makes the context understandable to the reader, as well as generate theory from the context (Dyer & Wilkins, 1991). As identified by Volmar and Eisenhardt (2020), the number of cases is a central issue in case study design, in which research can be single case, comparative case (i.e., two) or multiple case (i.e., more than two cases).

A single case study is used mainly to delve into a phenomenon deeply: “A single case enables the researcher to investigate a phenomenon in depth, getting close to the phenomenon, enabling a rich description and revealing its deep structure” (Cavaye, 1996, p. 236). As stated by Volmar and Eisenhardt (2020), researchers can articulate rich descriptions from a single case. Single case studies are particularly useful for exceptional or unique situations, or when the case is revelatory and being examined for scientific reasons (Cavaye, 1996; Yin, 2014). Furthermore, Benbasat et al. (1987) suggested that a single case that serves as a pilot study can be followed up with a multiple-case exploration. However, a single case study may not elicit sufficient insight into the phenomenon. Considering that it is characterised as a unique and non-

replicable situation, it comes with a risk that its findings may not be generalisable, i.e., able to be extended to other settings (Lee, 1989).

By comparison, a multiple case study enables researchers to examine different cases separately and simultaneously conduct cross-case analyses to synthesise the findings and draw on salient data patterns (Benbasat et al., 1987; Cavaye, 1996; Volmar & Eisenhardt, 2020). Thus, more general research results can be obtained and extended to other settings, or contrasting results may be produced for predictable purposes (Yin, 2014). Multiple case design helps the researcher understand rich descriptions of a phenomenon while simultaneously attaining the advantages of ‘replication logic’ (Yin, 2017). According to Volmar and Eisenhardt (2020), replication logic involves treating each case as a stand-alone experiment, such that the researcher develops theory iteratively in one case, then tests the emerging theory in the other, thereby repeating the cycle until a solid alignment between theory and data is achieved. Furthermore, the researcher also can inform the emerging theory with extant literature, which would help improve the internal validity of the emergent theoretical relationships’ underlying logic (Volmar & Eisenhardt, 2020). A key benefit of using multiple cases is that the researcher can distinguish between common trends and idiosyncratic aspects more easily (Volmar & Eisenhardt, 2020). Moreover, the conclusion drawn from multiple cases is more reliable and robust than from a single case, as it can shift the investigation from one organisational context to another, which helps examine the phenomenon more effectively (Yin, 2014). Multiple case studies generate more general findings and, thus, are more useful for theory explanation and extension compared with single cases (Benbasat et al., 1987). Nonetheless, despite the fact that the multiple-case approach is becoming more popular, it is more expensive and time-consuming to conduct (Yin, 2017).

After defining and discussing the key characteristics of case study research, it is worth highlighting the motivation for adopting case study strategy in this research. Thus, the choice of a case study research strategy for this research is justified and explained below.

4.4.4. Justifying Adoption of a Case Study Research Strategy

As stated in Chapters 1 and 2, limited literature exists regarding the implications from socio-technical factors’ interactions for e-Government implementation and its success.

Thus, a qualitative case study strategy was viewed as appropriate for investigating the problem, as it facilitated the researcher's close involvement with the case study, resulting in considerable insight into the events and actions, allowing him to generate theory from practice (Benbasat et al., 1987).

As a single case may not generate sufficient insight into the phenomenon, it was decided that the research design would utilise a multi-case study strategy. Multiple cases enabled the researcher to conduct an in-depth investigation of Oman's e-Government (Cavaye, 1996; Yin, 2014). The investigation yielded rich data, eliciting considerable insight into the case organisations' contexts, including environmental, organisational and technological issues. The choice of a multiple case strategy approach was determined by the need to examine a variety of cases that represent different e-Government implementation projects' settings, as they differ in function, structure, role and services. Furthermore, the use of multiple cases enabled the researcher to validate and cross-check the findings and elicit salient themes from the data. The study treated each case as a separate experiment in the conceptual framework presented in Chapter 3 to achieve analytic generalisation through replication logic, in which each case is comparable to a new experiment (Volmar & Eisenhardt, 2020; Yin, 2017). Furthermore, multiple cases provided more compelling evidence than a single case and, therefore, strengthened the findings and increased the reliability and robustness of the research, as the researcher was able to shift the investigation from one organisational context to another, which helped him better examine the phenomenon (Yin, 2014). Therefore, in the light of this justification, it was suggested that multiple cases, rather than a single case, were more appropriate to serve this study's purpose.

Having decided on a suitable research strategy, the research design devised for setting this research and planning the empirical study is explained in the next section.

4.5. Research Design

A rigorous research method is complemented by an effective research design that acts as an action plan for gathering relevant evidence to help answer the research question (Omar et al., 2020). Yin (2014, p. 28) defines *research design* as "a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and a set of conclusions (answers) about these questions can be found.

Between here and there may be found a number of major steps, including the collection and analysis of relevant data”.

In effect, following Yin (2014), the research design established for this study included four major constituents: conceptual design; empirical design; data collection; and data analysis. While research design guides the entire research process, data collection and analysis are performed in an iterative manner to allow for dynamic harmonisation between them and to collect sufficient data so that theoretical saturation could be reached (Eisenhardt, 1989).

According to Eisenhardt (1989), developing a unique research design allows the investigator to follow and adapt the most appropriate research methods to explicate and comprehend the phenomenon under study. Therefore, in the present study, the research design began by establishing the context of the research; stating the problem statement, motivation and scope; and identifying research questions and objectives (Chapter 1). This was followed by conducting a critical review of the related literature in a broader picture to devise the research area’s theoretical background, examine current research issues and identify literature gaps (Chapter 2). The research scope then was narrowed, and certain research issues were identified for further consideration. As a result, key socio-technical and influential factors, and other research issues were identified and presented visually in a conceptual model/framework (Chapter 3). Thus, the conceptual framework stands out as a point of reference guiding the empirical investigation of this research. Furthermore, the research design included a research protocol (case study protocol) as a blueprint to facilitate case selection, govern the data collection process and reinforce administrative and ethical issues concerning the research. The qualitative research design employed for this study allowed the researcher to examine in-depth complexities and processes of less-acknowledged phenomena, such as e-Government implementation through an STS theoretical lens, in less-documented and -published literature contexts such as Oman. This design also offered considerable flexibility to the researcher during data collection, allowing him to study the phenomenon in its natural setting, thereby informing theory from practice. In doing this, this study’s research design is depicted in Figure 4.1.

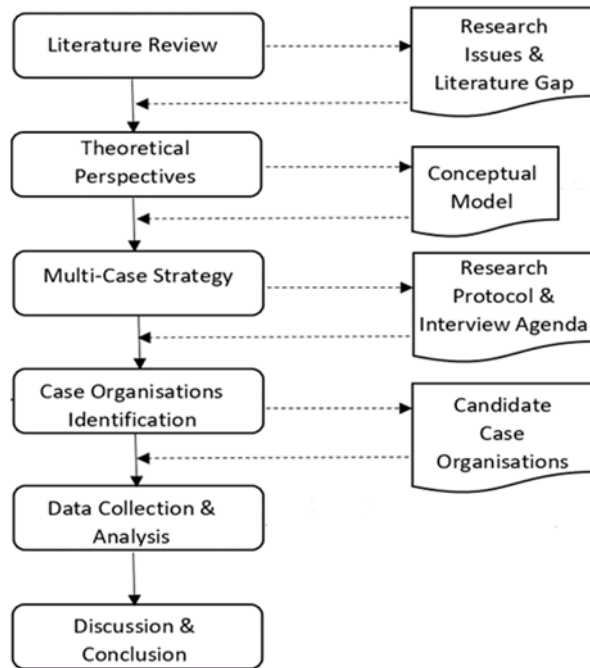


Figure 4.1: Research Design

This section aimed to demonstrate the execution of the fieldwork for investigating the implications of socio-technical factor interactions for e-Government implementation through an STS theoretical lens within time and other constraints tied to a PhD programme. Sub-sections 4.5.1–4.5.3 provide detailed descriptions of the empirical design, data collection and data analysis.

4.5.1 Empirical Design

Having already described the conceptual design in Chapter 3 (Conceptual Framework for e-Government Implementation), this sub-section describes the fieldwork plan for governing the data collection process.

4.5.1.1. Case Study Protocol

A case study protocol is a valuable resource that usually is developed to guide data collection (Eisenhardt, 1989; Yin, 2014). In this sense, Yin (2014) maintains that a case study protocol is an action plan that regulates and operationalises the data-gathering process. He suggests that a typical case study protocol should comprise the following four sections: an overview about the case study; data collection procedures; data collection questions; and a case study outcome report. Scholars recommend that the case study protocol follow uniform methods, particularly in multiple cases and/or

when a team of researchers is involved, as standardisation as such can enhance method rigour and outcome validity significantly (Miles & Huberman, 1994; Yin, 2014).

In the present study, following the conceptual design, a case study protocol was developed as a blueprint to enlighten the data collection process and investigate the research issues regarding e-Government implementation in Oman. In the case study protocol, the researcher identified the research topic, aim and objectives; specified the provisional schedule of data-gathering dates; and described the data analytical process. Within the protocol, the administrative and ethical issues of the research were outlined. The protocol also encompassed case selection criteria (as presented in the next sub-section). Moreover, a qualitative research method was developed to gather the data as the present study's research approach suggested. The method was devised in the form of an interview agenda which is the core of the case study protocol. The interview agenda is described in Sub-section 4.5.2.3.

4.5.1.2 Case Study Selection Criteria

The context of this case study research is Oman's government as represented by its Information Technology Authority (ITA), and the unit of analysis is the e-Government projects that Oman's government sponsored and that case organisations managed and executed. According to Benbasat et al. (1987), research questions and the unit of analysis determine the specific data to be collected. In effect, the researcher investigated three Omani public organisations. The process of case selection preceded the investigation of selective e-Government implementation projects at a national level that are making crucial socio-economic impacts on the national economy and society.

The following criteria, proposed by Lam (2005), were used to select potential case organisations for evaluation in the e-Government context:

- The project involved a significant amount of implementation work.
- The case organisation has a sound number of stakeholder groups.
- The case organisation has dealt with both technical and social implementation challenges and issues.

As the unit of analysis in this study is e-Government implementation projects, Lam's criteria were extended further by examining the following three factors:

- The case organisation's history in e-Government implementation project(s).

- The project(s)' economic and social impacts on government and society, regardless of project success or failure.
- Diversity in public services, serving a range of communities with various needs.

Accordingly, the case organisation selection and screening process followed the above criteria. In effect, the data collection process began with a 'selection and screening' process for case organisations. Data collection is described below.

4.5.2. Data Collection

The researcher investigated multiple Omani public organisations by examining selective e-Government inter-organisational implementation projects that are making crucial socio-economic impacts on the national economy and society. Sub-sections 4.5.2.1–4.5.2.5 describe the procedures and activities in the data-gathering process that the researcher carried out for this study to address the research inquiry.

4.5.2.1. Advisory Panel

Before beginning data collection, an advisory panel was formed, comprising six experts from academia and the professional IT/IS domain, to review the data collection procedures and instruments, and help increase the data's validity and reliability. From the outset, the panel members were consulted on the research protocol and interview agenda. The results from the initial analytical stage were brought forth for their review, and positive feedback was received with a few recommendations on the plan and interview questions. The members also showed great interest in the study and were eager to follow future developments in the research. The panel experts' details are listed in Table 4.1.

Name	Position	Place of Work
Dr. Zahran Al Salti	Assistant Professor and researcher in IS and e-Government.	Sultan Qaboos University, Oman
Dr. Wisal Al Belushi	IT research and planning specialist	Sultan Qaboos University, Oman
Dr. Taher Nasser	Computer science and IS development expert	A'Sharqiya University, Oman
Dr. Khalid Al Zadjali	DG of IT	Muscat Municipality, Oman
Sultan Al Wadhahi	DG of ICT	Royal Court Affairs, Oman
Ibrahim Al Wardi	DG of e-Government Services	Information Technology Authority, Oman.

Table 4.1: Members of the Advisory Panel

4.5.2.2. Case Organisation Selection, Access and Stakeholders' Identification

Before executing the empirical action plan for this study, which investigates the implications of socio-technical factors' interactions for e-Government implementation and its success in Oman, a connection with the ITA was established. ITA is the government body responsible for implementing IT infrastructure projects and overseeing e-Government initiatives in Oman (ITA, 2018b). With the established case selection criteria, ITA's support, personal contacts and the researcher's previous employment in the Omani public sector, guidance on selecting potential case organisations and facilitating access to them was offered. Securing access to case organisations was significant for the success of the research project, as discussing the research issues with the people in these organisations occupied a considerable amount of their time (Yin, 2014).

Accordingly, the interview process was preceded by a call for discussion with ITA professionals over a social media platform (i.e., a WhatsApp discussion group for e-Government integration). The director general for e-Government Services (DGeGS) personally responded to this call and suggested an initial meeting with the researcher. The meeting was held on 20 June 2018 in the DGeGS' office. During the meeting, the researcher demonstrated and explained the study's aims and objectives, as well as the data collection plan. The research topic and the motivations for focussing on e-Government implementation also were clarified. The DGeGS acknowledged the importance of conducting such research, particularly on socio-technical aspects of e-Government implementation, because of such critical projects' vitality in streamlining government operations. He asserted that e-Government implementation, however inter-organisational integration, had been one of the 'hot' topics capturing the government's attention, and that Oman's government had made numerous efforts from a strategic level towards achieving a satisfactory level of inter-organisational integration. The DGeGS resumed his talk and pointed out the challenges and barriers obstructing implementation from the Omani e-Government, then briefly described ITA's role regarding the establishment of policies, strategic planning and development of e-Government in Oman. He also emphasised ITA's pivotal role in integrating and linking e-Government services across public organisations and other stakeholders by implementing a central integration hub that automates and controls data sharing among various parties. He also pointed out ITA's mediating role played in facilitating

cross-organisational collaboration during planning and implementation of e-Government projects. After discussing the criteria of selecting the candidate case studies, the DGeGS suggested a list of e-Government projects, mentioning the organisations to which they belong. The initial list contained the following projects/organisations:

1. InvestEasy, Ministry of Commerce and Industry (MOCI)
2. e-Census, National Centre for Statistics and Information (NCSI)
3. National Registry System (NRS), Directorate General of Civil Status (DGCS)
4. Advanced Manpower Management System (AMMS), Ministry of Manpower (MOMP)
5. Tawtheeq, Ministry of Justice (MOJ)
6. Injaz, Ministry of Regional Municipalities (MORM)
7. Municipality Permits, Muscat Municipality (MM)
8. Al Raffd Project, Al Raffd Fund (independent government organisation)

Before the meeting ended, the researcher asked the DGeGS whether ITA could contact the above organisations and appoint liaisons so that the researcher could coordinate with them to get access to the respective organisations and participants. A list of contacts was provided to the researcher later.

In doing this, the researcher used his personal network to access the informants. Following this, the potential cases went through a screening process, and shortlisted candidate cases (five total) were selected for the study. However, the initial list of eight case organisations was maintained in the event of insufficient data or refusal to participate. The final five chosen projects and their case organisations were:

1. InvestEasy, Ministry of Commerce and Industry (MOCI)
2. e-Census, National Centre for Statistics and Information (NCSI)
3. National Registry System (NRS), Directorate General of Civil Status (DGCS)
4. Advanced Manpower Management System (AMMS), Ministry of Manpower (MOMP)
5. Municipal Permits, Muscat Municipality (MM)

After the five case organisations were selected, participants from each one were chosen, comprising various e-Government stakeholders, e.g., decision makers, project managers, operational staff, IT professionals, IT vendors and citizens. A principal

participant (focal point) was identified for each of the organisations, and emails were sent to them, explaining the objectives of the research, stressing its importance and requesting participation. Then, during actual data collection, the snowball sampling technique was employed to access further participants who met the criteria of the research objectives and who might be willing to participate in the study. The use of various knowledgeable respondents from different administrative levels helped reduce interviewee bias and offered diverse perceptions (Eisenhardt & Graebner, 2007).

4.5.2.3 Interview Agenda

The interview agenda comprised the topics to be discussed, stated all the questions to be asked during the interviews and identified the specific types of data to be collected. Considering that the e-Government context is complex and wide, and involves multiple stakeholders and cross-organisational collaboration, the line of inquiry included both organisational and inter-organisational levels of the e-Government projects.

The interview agenda's design was guided by the thematic structure of the conceptual framework, comprising sets of socio-technical factors identified from the extant literature that are perceived as influential to e-Government implementation. However, the interview questions underlying the interview agenda were open-ended to stimulate open discussions with participants and allow the researcher to discover new insights and facts that emerge from the field of study, such as socio-technical interactions. Therefore, the interview agenda was designed to cover questions relevant to the nature of e-Government implementation, focussing on the research issues (i.e., conceptual framework, research questions and objectives). The questions on the interview agenda were identified and structured around the conceptual framework's elements. The questions were divided into five main sections:

Section A: General interviewee information

Section B: Information regarding strategy, governance and general implementation issues of Oman's e-Government.

Section C: Background information about case organisation.

Section D: Information about the e-Government implementation project in the case organisation, project stakeholders and their role, socio-technical factors and participants' perceptions of how the socio-technical factors affected implementation.

Section E: General comments

The interview agenda was designed to answer the research question (Chapter 1, Section 1.5), while the type of information sought, according to this agenda, was divided into two institutional levels: strategy and policy level, and project implementation level, as presented in Table 4.2. The full interview agenda is provided in Appendix A.

Level	Organisation/ Government Unit	Participant's Role	Information Sought
1. Strategies and policies regarding the development of Oman's e-Government.	Information Technology Authority (ITA)	CEO/Representative	<ul style="list-style-type: none"> • Oman e-Government's vision and strategic plans, policies and regulations. • IT infrastructure readiness, frameworks for implementation and data/information sharing, and interoperability standards. • Potential case organisations/implementation projects and key stakeholders. • challenges and overall projects' progress. • Technical implementation; infrastructure information.
		DG of e-Services and IT Infrastructure	
		Director of e-Transfer	
		Head of Systems Integration Department	
2. Implementation of e-Government projects	Case Organisations	DG Information/CIO	<ul style="list-style-type: none"> • Organisation background and e-Government plans. • e-Government implementation project(s), stakeholders, challenges, implementation stages. • Stakeholders' perceptions of influential factors.
		Director of IT/IS	
		Team Lead of e-Services Development	
		Head of IT Infrastructure Department	
		Project Manager	
		Application Developer/Integrator	
		Operational Clerk	
		IT Vendor Representative	
		Citizen	

Table 4.2: Interview Information

4.5.2.4. Semi-Structured Interviews

Interviews represent the main data source in case study research while using qualitative data collection methods (Walsham, 1995b). Many of the benefits of interviews, specifically semi-structured interviews, include the ability to ask questions, check and collect additional data, flexibility in the sequencing of questions and the ability to clear up any confusion (Bell et al., 2018).

In this study, the researcher conducted semi-structured interviews (Yin, 2017) using open-ended questions on the factors perceived as influential to e-Government implementation. Thus, the data were gathered through face-to-face interactions within the natural settings of the participants' workplaces. Data gathered through direct interactions with the participants, within their chosen contexts, is a key feature of qualitative research (Creswell, 2013). Eriksson and Kovalainen (2015) argued that semi-structured interviews are appropriate for answering open-ended 'what' and 'how' questions, in line with the type of inquiry in this research. Furthermore, the questions' open-ended nature offered both the researcher and interviewees the opportunity to address any of the issues in more detail, with more flexibility. In doing so, the researcher was able to obtain substantial in-depth data. This also gave the researcher access to insights and views of the participants with regard to actions and events that were happening or already had happened and affected e-Government implementation projects.

Conversely, structured interviews would have allowed for less latitude for the interviewees to respond and convey their ideas and perceptions freely, whereas unstructured interviews would not have prompted a set of predetermined questions to be asked (Bell et al., 2018). Therefore, the semi-structured interview was viewed as most suitable and, thus, was adopted as the primary data collection method in this research.

The interview agenda (as already presented above) was structured into sections that covered both policy and organisational levels, including strategic, managerial and operational. Considering that the unit of analysis was e-Government projects, the interviews were conducted with key projects' stakeholders from three levels within the projects' organisational charts from the five organisations. The interview questions for the three types/levels of participants followed a similar chronological structure, but

were adapted to the roles and level of involvement in the respective projects. In addition to the five organisations, four participants from ITA were interviewed to understand ITA's role with respect to e-Government projects. These interviews focussed on policy, management and mediatory roles, as well as technical infrastructure and support that ITA provided. ITA's CEO also was invited to participate, but was out of the country. However, a copy of the interview questions on his particular level was emailed to his coordinator to present to him upon his return. The researcher then received the CEO's feedback later.

To identify the participants, the purposive sampling technique was followed first. The very first participants interviewed were the focal points, who also were in senior management positions/roles. The reason was to understand the overall organisational context and ease access to other participants. A snowballing technique then was followed to identify further participants. In doing that, the key participants were used to recommend other participants who met the research objectives' criteria and who might be willing to participate in the study. This process led to interviews with ten to eleven participants from each case organisation, either internal or external stakeholders, including vendors, agent offices (brokers) and citizens/commercial investors. Table 4.3 below lists the participants who were interviewed.

The actual interview process took place between June and August 2018, but the researcher returned to the field between January and February 2020, after the principal data analysis stage. The process was amended further, and a bit more data were collected later, between June and August 2021, to clarify some details and gather other data thought to be necessary. Each interview took approximately one to two hours. To exploit data gathering, participants were provided with a copy of the interview agenda before their scheduled interview times to familiarise them with the questions. This aimed to make the participants feel more comfortable responding to the questions, as well as to help ensure they did their level best to answer them thoroughly. Such research tactics helped control interview time, facilitated smoother discussions and yield higher-quality data (Maimbo & Pervan, 2005).

Some participants opted to be interviewed in Arabic, their native language, thereby allowing them to express their perceptions easily and fluently. This helped make the interviews richer in detail and allowed for more interactive and insightful dialogue

between the researcher and the interviewees. However, this also entailed translating the Arabic interviews, after transcription, into English, which increased overall transcription time. Every interview was recorded with each interviewee's consent, except three participants who did not wish to be recorded. In these cases, every effort was made to ensure that the notes were as complete as possible. The recordings facilitated the collection of more accurate data that provided much greater detail, a process that was more effective than notetaking.

Furthermore, before each interview and according to the case study protocol's ethical guidelines, the interviewees were notified that they could discontinue and withdraw from their interviews at any time.

During and after the interviewing process, the researcher kept in touch with the participants through email or the WhatsApp chat app for follow-ups, including clarification of issues that were unclear to the researcher, and/or to confirm interview transcript content.

Ser.	Organisation	Interview Date	Participant's Position
1	Information Technology Authority (ITA)	20/6 and 1/8/2018	DG e-Government Services
2		1/8/2018	Software Integrator
3		1/8/2018	Senior Executive, e-Services
4		19/8/2018	Head of Integration
5		25/8/2019	CEO
6	Ministry of Manpower (MOMP)	5/7/2018 and 8/1/2020	DG IT
7		8/7/2018	Project Manager
8		3/7/2018	Head of Data Centre Management
9		3/7/2018	Programmer
10		3/7/2018	Software Integrator
11		5/8/2018	Project Manager (Vendor)
12		3/7/2018	Senior System Administrator
13		3/7/2018	Network Engineer
14		20/7/2018	Agent
15		14/8/2018	Citizen/End User
16		18/8/2018	Citizen/End User
17	Ministry of Commerce and Industry (MOCI)	30/7/2018	IT Director
18		12/8/2018 and 20/1/2020	Project Manager
19		2/8/2018	Project Manager (Vendor)
20		30/7/2018	Systems Analyst
		1/8/2018	Senior Executive, e-Services
21		16/8/2018	Marketing Researcher

22		30/7/2018	External Stakeholder (Oman Chamber of Commerce and Industry)
23		16/8/2018	Front Desk Service Operator
24		16/8/2018	Investor/End user
25		16/8/2018	Investor/End user
		27/6/2021	Media Specialist
26	Muscat Municipality (MM)	7/8/2018	DG IT
27		9/8/2018	DG of Directorate of Al-Amrat (MM Subsidiary)
28		13/8/2018	Project Manager
29		18/8/2018	System Integrator
30		9/8/2018	Senior CRM Specialist
31		7/8/2018	Senior Programmer
32		9/8/2018	Front Desk Service Operator
33		13/8/2018	Senior Technical Consultant (Vendor)
34	National Centre for Statistics and Information (NCSI)	26/8/2018 and 11/2/2020	DG Census
35		26/8/2018	DG Information
36		27/8/2018 and 11/2/2020	Project Manager
37		27/8/2018 and 11/2/2020	Project Management Officer (PMO)
38		27/8/2018	Database Administrator (DBA), Population Databases
39		27/8/2018	Project Coordinator, PMO and Data Collection
40		23/6/2021	Data Analyst
41		28/6/2021	Data Analyst
42		5/8/2021	Data Analyst
43	Directorate General of Civil Status (DGCS)	26/7/2018	DG Civil Status

Table 4.3: List of Organisations and Interviewees

It was quite challenging to have a fixed meeting diary with specific timelines for the interviews, considering that most of the concerned participants had been involved in different projects; thus, their availability was low. Adding to this, some of them were on annual leaves. For these reasons, case organisations could not be studied back-to-back, but rather the interviews were conducted based on participants' availability without following a particular order of case organisations. One of the organisations (DGCS) nominated a single participant in a senior position to be the only contact for the study. When asked to identify and nominate other participants, he refused, claiming that all the facts and subjects concerned with the project under study were strictly confidential. For this reason, the researcher decided to withdraw this case

organisation. Furthermore, in the Muscat Municipality (MM) case organisation, it was found that no particular project could comply with the case/project selection criteria. Thus, MM also was excluded. Therefore, the selection and screening process eventually resulted in the investigation of three case organisations: Ministry of Manpower (MOMP); Ministry of Commerce and Industry (MOCI); and National Centre for Statistics and Information (NCSI), with their associated projects. These are in addition to ITA.

4.5.2.5. Secondary Data and Method Triangulation

Case study research supports the use of multiple data collection methods – such as interviews, documents, observations and physical artefacts – to obtain rich data on the phenomenon under investigation and to help understand the contextual complexity (Benbasat et al., 1987). In this respect, Gil-Garcia and Pardo (2006) asserted that using the multi-method approach to understand e-Government complexity offers four key benefits: offering a more comprehensive approach to the phenomenon; enabling triangulation of results; allowing for a broader set of questions to be asked (e.g., what, how, why); and facilitating in-depth exploration (Snead & Wright, 2014). Triangulation is a mechanism that many scholars recommended highly (e.g., Miles & Huberman, 1994; Yin, 2014), as it boosts the validity, trustworthiness and reliability of research (Maimbo & Pervan, 2005) and provides more comprehensive and robust findings than single-method approaches (Snead & Wright, 2014).

In this study, in addition to the interviews, data were collected through other sources, including archival documents, official reports and organisations' websites. The use of multiple data collection methods allowed for triangulation of results, offering a greater substantiation of theory (Eisenhardt, 1989) and enabling the researcher to discover untold aspects about the e-Government implantation phenomenon, as well as cover most of the key issues within the given study period (Omar et al., 2020). During the interviews, a few documents were collected from the case organisations, which were contacted through the focal points to provide more sources upon the researcher's request. The organisations' websites also proved useful in collecting cases' background information and examining their structure and the types of services they provide. The use of documentary sources in this research enabled the researcher to cross-check particular issues and gather information that participants had cited and recommended during the interviews as complementary data. Thus, consulting such sources and

compiling them with interview results allowed for data triangulation, which helped provide a full picture of the phenomenon under study.

4.5.3. Data Analysis

This research used a qualitative interpretive approach to data analysis. The principle behind using qualitative data analysis is to make sense of collected data to present the findings (Williamson, Given & Scifleet, 2018). The analysis of case study findings in particular is one of the most difficult parts of doing case studies (Yin, 2013). Qualitative data analysis emphasises the development of a kind of structure for categorising and grouping data to help capture particular data segments and assign them to research questions/hypotheses, concepts or themes (Miles & Huberman, 1994), while maintaining the flexibility to adjust and modify data categories (Williamson et al., 2018). Creswell (2013) describes how qualitative data analysis is a continuous process during research that includes scanning data transcripts, organising and preparing data, coding data into themes, reporting the findings and interpreting them, discussing findings in the context of extant literature and raising new inquiries or calling for further actions, particularly when using a theoretical lens. Furthermore, Creswell notes that reporting the findings should present different individual perceptions and be backed by multiple quotes and specific evidence from the raw data.

Nevertheless, multiple approaches to qualitative data analysis can be used (Williamson et al., 2018). Each and every approach can support specific research purposes, and the same holds for the interpretation of findings, which also can take different forms, being both adaptable to different research designs and flexible to communicate alternative meanings (Creswell, 2013). The qualitative data analysis and interpretation technique “much depends on an investigator’s own style of rigorous empirical thinking, along with sufficient presentation of evidence and careful consideration of alternative interpretations” (Yin, 2013, p. 127).

4.5.3.1. Analytical Process

As mentioned earlier, this research adopted the interpretive approach, following Orlikowski (1989), and Walsham and Waema (1994), who used a theoretical framework to guide empirical research. Therefore, in this research, case studies were introduced and analysed from the perspective of the conceptual framework, and key

implications were discussed for e-Government implementation. The conceptual framework's dimensions, key factors and sub-factors were used, as a coding scheme, to organise and prepare the data for interpretation, rather than using open coding: "Coding is a subjective process to some extent because the researcher chooses the concepts to focus on" (Walsham, 2006, p. 325). A key part of this research concerns identifying and explaining socio-technical factors' interactions in the data by cross-examining the facts and interlinking factors and/or sub-factors together to discover their interdependencies and interrelationships. From these interactions, propositions regarding implications for e-Government implementation projects are generated. Eisenhardt (1989) stated that the output from case study research may be concepts, a conceptual framework, propositions or mid-range theory (Walsham, 1995a). Such a process is an inductive approach to interpretive analysis (Walsham & Waema, 1994): "An interpretive analysis is an induction, guided and couched within a theoretical framework, from the concrete case situation to the social totality beyond the individual case" (Walsham & Waema, 1994, p. 151).

Therefore, the analytical process was performed iteratively following a systematic order in three key stages (as depicted in Figure 4.2 below):

- Stage 1: For every case study, the data were organised according to sets of predefined dimensions, factors and sub-factors as delineated in the conceptual framework. This was followed by analysing the effects from the socio-technical factors on the e-Government implementation projects. This activity was aided by computer-based analytical software as described further in Sub-section 4.5.3.2.
- Stage 2: The findings from the three case studies then were synthesised and compared. This activity is described in Sub-section 4.5.3.3 and discussed in detail in Section 5.7.
- Stage 3: The outcome from the previous two stages was reviewed for evidence of interaction between and among factors (Faerman et al., 2001). It was examined to interpret and construct from the data the interactions between socio-technical factors, how these factors interact and affect each other, and the implications for the process of e-Government implementation and its success. This activity is described in Sub-section 4.5.3.4 and discussed in detail in Chapter 6 (Analysis of Socio-Technical Interactions and their

Implications for e-Government Implementation and its Success). Next, the outcomes of the interactions were compared and discussed with relevant theories and extant literature. Thus, it follows that a conclusion was drawn in terms of theoretical propositions, and implications on both theory and practice were outlined.

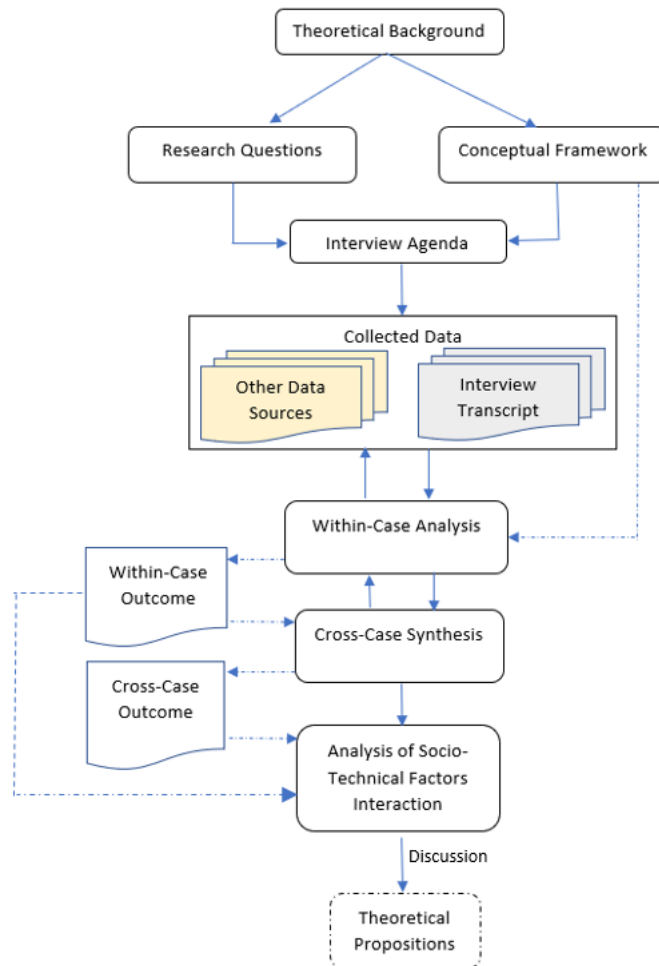


Figure 4.2: The Analytical Process in this Research

Many researchers recommend analysing the data as they are collected (Miles, Huberman & Saldaña, 2014; Strauss & Corbin, 1998; Williamson et al., 2018). The analytical process in this study proceeded hand-in-hand with the data collection process. The two processes working concurrently allowed them to overlap and inform each other, which also facilitated theory building through the emergence of concepts and ideas, prompting additional investigation (Williamson et al., 2018). The analytical process involved sorting and categorising the interview transcripts, as well as other secondary sources used in this study, systematically (Williamson et al., 2018) and in

the structure and order presented in the conceptual framework. Such a systematic process led to the generation of the outcome from the findings report.

According to Creswell (2013), the qualitative analytical process requires that the researcher inspect the data to decide on including the meaningful parts and excluding unnecessary ones. This process normally leads to categorising the data into groups of 'themes' and/or sub-groups. In this research, the analytical process was shaped by the thematic structure of the conceptual framework. Guiding the analysis through research questions and a conceptual framework is recommended (Williamson et al., 2018; Yin, 2013). Yin (2013) notes that following the theoretical perspectives of research upon which the research design, questions and objectives were drawn is a preferred data analysis strategy because theoretical perspectives enlighten the data collection plan, so such an analytical approach is viewed as feasible and relevant.

It follows that the analytical process in this research, as shown in Figure 4.2, started as early as when the interview agenda was created, with the interview questions following the conceptual framework's structure. The same setting was used to categorise the transcribed data from the interviews and the other supplementary data sources. Accordingly, the reporting of the findings followed the same structure. In this report, quotes from the transcripts were included and embedded wherever appropriate as evidence to bring participants' voices to the research and support the findings. This is viewed as a key element of an interpretive research approach, such as the current one.

4.5.3.2. Computer-Aided Qualitative Analysis

A computer-based qualitative analysis software package aided the data analysis in this research. ATLAS.ti software (Versions 8 and 9) was used to help analyse the semi-structured interviews' transcripts and the other supplementary data sources. The advantage gained from using such software was apparently in expediting and simplifying the mechanistic and routine aspects, eliciting a more systematic data analysis. It was found to be a valuable tool, as it allowed for creation of codes that represented the thematic categorisation of the data and helped code large chunks of unstructured texts. Moreover, it offered an effective and transparent mechanism to map relevant segments of text to the codes. This process would have been tedious and time-consuming if conducted manually.

Many researchers support the use of computer-based tools in data analysis (e.g., Creswell, 2013; Miles & Huberman, 1994; Myers, 2019; Yin, 2013). The issue of using computer-based tools, as such, has been discussed widely in the literature (Miles et al., 2014; Williamson et al., 2018). For example, Williamson et al. (2018) argued that using computer-based software tools, e.g., ATLAS.ti and NVivo, offers many sophisticated features to aid researchers during analysis, including automated generation of word counts and keyword lists, matching and sorting functionalities, and audio and video labelling.

The use of ATLAS.ti in this research aided two key stages of the research: the literature review and the data analysis. During the literature review stage, the software was used to categorise the topics of the literature being reviewed, including the construction of the conceptual framework. The articles under review were uploaded into the software while codes were being created for every topic and sub-topic. The process of coding had been performed in an iterative manner to allow for adding new codes and modifying existing ones according to the content at hand. While going through the articles, the content viewed as relevant was assigned to a specific code or set of codes. The researcher generated an outcome report periodically using the software's reporting utility. The reports' content was structured according to the codes (i.e., topics) and article titles to allow for easy and fast access to the intended information before paraphrasing.

During the data analysis stage, the coding process followed the same steps, but the codes used were constructed from the conceptual framework corresponding to the main and sub-factors, i.e., this stage is complementary to the previous stage given that the conceptual framework was constructed from the literature. It follows that all interview transcripts and other supplementary documents were uploaded into ATLAS.ti to be scanned. The researcher performed the scanning process manually, but it had been done repeatedly to ensure that no relevant information was left behind. Likewise, the tasks of text assignments to the codes and report generation followed the same steps as during the literature review stage. The outcome reports were structured according to the codes and transcript/document names. The outcome reports then were moved forward to the next level to support the findings and interpret the results. Stepwise, the data coding and scanning process can be summarised in five key steps:

- Step 1: Create codes that represent the thematic categorisation of the data, following the conceptual framework's main and sub-factors.
- Step 2: Upload the interview transcripts and other supplementary documents to the software to be scanned (the researcher performed the scanning process manually, but it had been done repeatedly to ensure that no relevant information was left behind).
- Step 3: Map the relevant text segments to the appropriate code(s).
- Step 4: Generate outcome reports (the reports' content was structured according to the code and transcript/document name).
- Step 5: Move the outcome reports to the next level to support the findings and the analysis of the results.

Graphical demonstration samples of Steps 1–4 can be found in Appendix B.

4.5.3.3. Cross-Case Synthesis

The researcher performed cross-case synthesis to present an in-depth interpretation of the main findings. The researcher compared and contrasted the three case studies to highlight salient themes and key lessons. The three cases investigated in this research differ in the degree and complexity of e-Government implementation by applying technology and other means. In doing so, a comparative contextual interpretation of the three case studies was performed to note the contextual difference in terms of organisational settings, and a collective combinatory comparison of factors' significance was offered. This cross-case synthesis process allowed for deeper investigation and understanding of the phenomenon under study in diverse settings (Yin, 2014) and helped achieve the key principle behind interpretation, which is primarily capturing "the lessons to be learned" (Lincoln & Guba, 1985, p. 371). Creswell (2013) stated that interpretation of the findings is a final step in qualitative data analysis, noting that the lessons to be learned could be the researcher's own perspective drawn from his personal culture, history and experiences. It also may be a concept emerging from discussing the findings with extant literature or theories. In doing so, the researcher confirms that the results either agree or disagree with prior knowledge. Based on this, the researcher may suggest a set of new questions that need to be raised for further investigation, or theoretical propositions to establish an agenda for future research, which was not foreseen earlier in the study.

Yin (2013) argued that the outcome resulting from cross-case synthesis is likely to be more robust than that resulting from individual cases. However, Yin also warned that one should be cautious when conducting cross-case synthesis, considering that the interpretation of results is subjective and relies on the researcher's personal conceptions.

Finally, the iterative process between data collection and analysis continued until theoretical saturation had been reached, and the iteration process did not elicit any new ideas (Eisenhardt, 1989). Therefore, it can be argued that selecting additional case studies with a similar setup would have provided similar results.

4.5.3.4. Analysis of Socio-Technical Interactions

According to STS theory, the outcome of an STS is the result of joint interactions between social and technical sub-systems, and between them and the external environment that affects or is affected by the system (Bostrom & Heinen, 1977b; Khan et al., 2011; Pardo et al., 2004; Walker et al., 2008). Furthermore, STS theory argues that anticipated results from the work system may not be attained unless these two sub-systems' interdependency is recognised explicitly and addressed (Bostrom et al., 2009).

According to Bostrom and Heinen (1977a), introducing a technical solution into an organisation implies direct and indirect effects on the process, people and structure. Direct effects normally are practised within organisations after the introduction of technology, including changes in tasks, processes, existing information systems or workers' behaviour. However, indirect effects (also called secondary effects) emerge as implications from direct effects. Eason (2014) argued that predicting the consequences after a technical system has been introduced can help prevent unwanted results. Following this, interactions among socio-technical factors were constructed by reviewing the outcomes of within-case analysis and cross-case synthesis processes. This was done by interlinking the factors/sub-factors and identifying the interdependencies between them. Orlikowski and Baroudi (1991) noted that one feature of interpretive research is to address contextual knowledge insights, such as the interaction among various components of a system.

Faerman et al.'s (2001) model has been adopted in this research to represent interactions among socio-technical factors visually. Faerman et al. (2001) developed their model to explain the interactions among factors influencing public-private inter-organisational collaborations in financial markets. The model, as presented in Figure 4.3, contained four essential factors that the authors viewed as very significant in collaborative efforts as such: leadership; initial disposition; issues and incentives; and the number and variety of groups. Faerman et al.'s model was viewed as applicable and relevant to this study's context, so it has been adapted for analysing and modelling interactions among socio-technical factors affecting e-Government implementation. The empirical analysis of socio-technical factors' interactions is described and discussed in Chapter 6, Section 6.3.

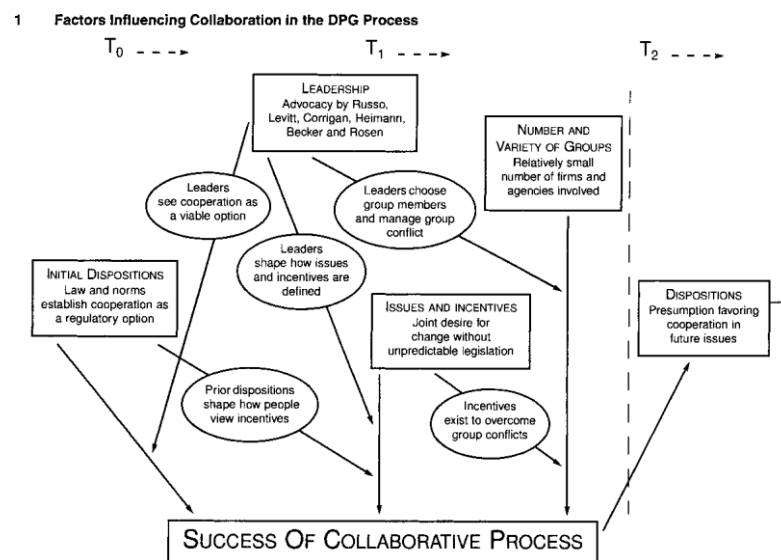


Figure 4.3: Faerman et al.'s (2001) Interaction Model for Public-Private Collaboration in the Financial Market

4.6. Ethical Considerations

Researchers in the social sciences, specifically qualitative research, have highlighted the importance of maintaining standards in research ethics and anonymity issues, including the protection of participants' identities, as well as research sites' confidentialities (Creswell, 2013; Myers, 2019; Tilley & Woodthorp, 2011). For example, Creswell (2013) argued that a certain code of conduct needs to be applied before and during research, as well as while collecting, storing and analysing data, and while reporting and disseminating results.

In effect, this study follows the ethical standards and code of conduct of academic research, specifically the University of Liverpool's (UoL) ethical regulations. As a regular UoL procedure, this empirical study, before it could have been conducted, had undergone an ethics review from the university's ethics committee. During data collection activities, all participants were provided with a copy of the research description (i.e., Participant Information Sheet) and were asked to sign a consent form to declare their willingness to participate in the research, explaining that their participation is voluntary and that they could withdraw at any time during the study. Furthermore, the participants were assured that all collected information would not be used except any purposes beyond this research, and that their privacy and anonymity would be maintained and treated in a strictly confidential manner.

4.7. Summary

This chapter provided an overview of the study's research philosophy, epistemological stances, and methodological approach, while justifying the selection of the interpretive qualitative approach for guiding and carrying out this particular research. The chapter also described the research strategy used to conduct the field work. It was decided that multiple case study design was the most appropriate strategy for this research. The chapter also presented the research design depicting the study's systematic flow. The data collection methods employed included face-to-face semi-structured interviews and document analysis, enabling the researcher to capture in-depth perceptions and experiences from the participants in natural settings. The interpretive analysis technique was judged to be the appropriate technique for analysing the data. The issues related to ethical considerations also were presented and discussed.

Having addressed the research methodology adopted for this study, which set the foundation and basis for upcoming research stages, the next chapter presents the practical implementation of this methodology by analysing the data collected from the case organisations and reporting the findings.

CHAPTER 5: Case Studies Analysis and Findings

5.1. Introduction

The previous chapter (Chapter 4) discussed and justified the adoption of a multiple case study strategy as the research methodology for this study. Based on the selection criteria devised by the research methodology, three government organisations were selected as case studies. The aim of this chapter is to analyse the effects of the socio-technical factors on e-Government implementation and its success (as per objective 2 of this research).

This chapter uses the key socio-technical factors that can affect e-Government implementation and its success to analyse the three case studies involved in the implementation of three key e-Government projects in Oman. These factors were identified from the existing literature, which is associated mainly with information systems, public administration, and e-Government domain areas. A conceptual framework of the key socio-technical factors has been constructed in which the factors have been grouped into the dimensions of environmental, organisational, and technological, and classified as main and sub-factors. The analysis process presented in this chapter has been guided by the conceptual framework, which formed the basis of the analysis, and by the coding process as described previously in Sub-section 4.5.3.2.

In doing that, this chapter analyses the findings of the case studies, one by one. In other words, each case study is examined independently from the others. This will be followed by cross-case synthesis to understand the contextual differences and similarities of the case organisations and highlight the comparative significance of the socio-technical factors affecting e-Government implantation and its success. The analysis process has been guided by the conceptual framework of this research.

As noted in the previous chapter, the analysis of the cases is presented in a way that protects, as much as possible, the identities of the participants and individuals. Therefore, the participants' names are kept anonymous, and their roles are used instead. Each case study analysis follows a common structure that presents the case organisation's background followed by the analysis of the sets of the factors.

In doing this, this chapter is divided into eight sections, including this introduction. Section 5.2 sets the background of the study context, which is Oman, focusing on the socio-economic and technological capabilities of the country as a developing state. Section 5.3 sheds light on the e-Government development and implementation in Oman. Sections 5.4 to 5.6 present the findings of the data analysis of the three case studies engaged in e-Government implementation initiatives in Oman. An overall view of comparative importance with respect to the significance of the socio-technical factors on e-Government implementation and its success is provided in Section 5.7. Finally, Section 5.8 summarises this chapter.

5.2. Background of the Study Context: Oman as a Developing Country

Since the empirical study of this research considers cases from Oman, a developing country, it is useful to shed some light on the socio-economic contextual features of the country. Khan (2011) states that contextual factors play a critical role in the Middle East countries, including Oman.

The Sultanate of Oman is an Arab, Muslim nation located in the far southeast of the Arabian Peninsula (Supreme Planning Council, 2019) bordering Saudi Arabia, the United Arab Emirates and Yemen (Khan, 2011). It is the third-largest country in the Arab world (Khan, 2011) with a land area of 310,000 square kilometres and a population of 4.7 million, 46% of whom are expatriates (Supreme Planning Council, 2019). Oman is a relatively small oil-producing nation and is one of the least populous Arab countries (The Heritage Foundation, 2020). Historians indicate that the Omani civilisation has long prospered from the Indian Ocean trade (Central Intelligence Agency, 2020; The Heritage Foundation, 2020). Oman is also part of the Arab Gulf/Gulf Cooperation Council (GCC) countries among Saudi Arabia, United Arab Emirates, Qatar, Kuwait and Bahrain (Khan, 2011).

Oman's modern renaissance started during Sultan Qaboos bin Said's rule of the country (The Heritage Foundation, 2020). On 11 January 2020, Sultan Qaboos, the longest-reigning ruler of Oman, died and his cousin, the former Minister of Heritage and Culture, Haitham bin Tariq, was sworn in the same day as the current Sultan of Oman (Central Intelligence Agency, 2020).

5.2.1. Overview of Social and Economic Development in Oman

From the beginning, the Omani government has been striving to achieve social and economic development, diversification of the economy, sustainable prosperity, improvement in social welfare and the well-being of people and equality between social groups, sectors and regions through the implementation of sound socio-economic policies (Ahmed, 2013). As a result, Oman has been classified among the high-income and human development countries in the World Bank's recent classification (World Bank, 2020). Oman held its first municipal council elections towards the end of 2012 as part of its efforts to decentralise authority and encourage greater citizen participation in local governance (Central Intelligence Agency, 2020; The Heritage Foundation, 2020).

Substantial improvements were made in delivering basic and expanded social and human services and in continuously improving people's welfare rates, investments in education, health and housing sectors, as well as the provision of various forms of social assistance and subsidies to the poor and the most disadvantaged groups (Ahmed, 2013). By doing so, Oman has succeeded in raising the country's social and human development standards. According to an article published 1 August 2020 in the *Oman Daily Observer* newspaper ("Oman Ranks High in Human Development," 2020), Oman's ranking in the 2019 Human Development Index (HDI), issued by the United Nations Development Programme, has improved. Oman is now ranked 47th out of 189 countries and fifth in the Arab and Gulf region, earning 0.834 points (with a rating varying from zero to one) with one notch up against the previous year (compared to 0.704 points in 2000 and 0.793 points in 2010). The Sultanate has retained its position among the most humane developing countries, which demonstrates progress in the main fields that measure the average achievements in a country for three basic dimensions of human development: long and healthy life, knowledge acquisition, and adequate living standard, as stated in the article. The newspaper has reported that the Sultanate has achieved a notable increase in the number of expected years of education to 14.7 in 2019 as the most improved Gulf country in the index, compared to 13.9 in the 2018 survey. Regarding the extent of obtaining the resources necessary to achieve a decent standard of living, the article indicated that the average per capita GDP of the Sultanate has reached \$37,039 and the life expectancy at birth has risen to 77.6 years.

Subsequently, Oman has attained progressive indicators in different social aspects. The population of the country has grown from 1.4 million in 1985 to 2.9 million in 2008 (Swales, Al Said, & Al Fahdi, 2012) and 4.7 million in 2019, with foreigners representing approximately 46% of the total population (Central Intelligence Agency, 2020). This coincided with advancements in other aspects of human prosperity.

In the economic development venue, Khan (2011) contends that economic growth in the Middle Eastern countries, including Oman, is relatively slow. The researcher identifies that factors like lagging political reforms, dominant public sectors, underdeveloped financial markets, high trade restrictiveness and inappropriate exchange rate, along with the rising rate of unemployment, closed economy, over-dependence on the oil and lack of privatisation initiatives, as the main barriers of economic development. However, in recent times several countries have intensively pushed the privatisation programme and Oman is one of them (Khan, 2011). Oman relies heavily on its dwindling oil resources, which generate about four-fifths of national revenue (Mohsin, Ba-Awain, & Daud, 2018; The Heritage Foundation, 2020). In particular, the oil sector contributes 87% of budget revenues, 51% of GDP and 60% of total exports (Mohsin et al., 2018). Tourism, transportation, mining, refining, and the gas sectors are core components of the government's plan for the diversification of resources (The Heritage Foundation, 2020). The Sultanate joined the World Trade Organisation (WTO) in 2000 and signed a free trade agreement (FTA) with the USA in 2006 while improving its labour laws in line with international standard (Khan, 2011).

Oman also wishes to reduce its heavy dependence on its dwindling oil wealth and spur growth in other industries like tourism, transportation, mining, refining, and gas as core components of the government's plan for diversification (The Heritage Foundation, 2020). The pursuit of social and economic growth has been the primary priority goal sought by both the short-term programmes and the long-term planning strategies. Since oil reserves are diminishing and oil global prices are fluctuating in recent years, the Organisation of Petroleum Exporting Countries (OPEC) members agreed in 2017 to decrease their oil production, which presents a challenge to Oman's economy (Mohsin et al., 2018). Such a situation has driven the Omani decision makers to develop alternative programmes that focus rather on non-oil resource revenues to

sustain the socio-economic development of the state (Ahmed, 2013; Central Intelligence Agency, 2020; Mohsin et al., 2018). This shift in thinking has laid the foundation for new economic policy since the launch of the long-term strategic plan (Vision 2020) in 1996 (Swales et al., 2012).

Nevertheless, Oman's economy has been regarded as a moderately free economy in the past 25 years. According to The Heritage Foundation (2020), Oman's score for economic freedom is 63.6, making its economy the 75th freest economy in the world in the 2020 ranking. Its overall score rose by 2.6 points, with major changes in all aspects of the rule of law. Oman ranks sixth among 14 countries in the region of the Middle East and North Africa, and its overall ranking is marginally above the regional and global averages (The Heritage Foundation, 2020). However, the Foundation argues that the regulations for doing business in Oman are still too inefficient to attract foreign traders and require further reform in the law and the burdensome bureaucratic procedures to facilitate a fast and effective process for starting and conducting business.

According to the Omani Supreme Planning Council (SPC), Omani sustainable development is a fundamental part of equity, justice, tolerance, engagement and “leaving no one behind” principles and values that have been profoundly rooted in Omani culture ever since its inception (Supreme Planning Council, 2019, p. 7). This has been exemplified in attaining notable accomplishments over the last few years in key economic, financial, environmental, cultural, and political areas of sustainable development. The most recent SPC report outlines that Oman Vision 2040 is one of the most relevant outreach programmes conceived under a strategy for collaboration and engagement of stakeholders aimed at fostering a participatory approach in future planning. It seeks to consider local communities' priorities and aspirations in drafting the vision to empower all segments of society across the Sultanate – especially youth, women, the private sector, and civil society organisations – to participate actively in the Sultanate's sustainable development efforts. The said vision has also considered regional and international economic variables, in particular global oil price fluctuations and global economic downturn in the uncertain regional geopolitical conditions adversely affecting Oman's financial situation. In addition, Vision 2040 also seeks to improve work development to accommodate job seekers and newcomers

to the labour market whose numbers are expected to expand significantly and increasingly in light of the youthful situation; encourage the process of economic diversification with a view to the national economy's reliance on oil imports and exports; as well as build a private sector that is effective, profitable and capable of making optimum use of Oman's human and natural resources (Supreme Planning Council, 2019).

5.2.2. Overview of the Technology Development in Oman

Regarding the latest technology development in Oman, the SPC in its recent Voluntary National Review of the Sultanate (Supreme Planning Council, 2019) elaborates that the country has been working toward achieving preparedness in the fourth industrial revolution (FIR) and how this can be leveraged to contribute to the sustainable development goals (SDGs) of the country's strategic vision 2040. In this context, the World Economic Forum report, "Readiness for the Future of Production" (World Economic Forum, 2018) which tests countries' readiness to capitalise on the opportunities provided by the FIR, avoids its risks and assesses the readiness for potential changes, ranked the Sultanate 45th out of 100 countries in terms of production and 70th in terms of the structure of production components. The report analyses the national policies that the Sultanate has put in place since 2011 to boost its readiness and ability to keep up with rapid developments in FIR technologies. These include the Digital Oman Strategy, the National Broadband Strategy, the National Innovation Strategy, the e-Commerce Strategy, and the National ICT Strategy. The report also presents the national initiatives launched by the Sultanate which lay a solid foundation for its transformation and readiness for the FIR, as well as several examples showing the importance of ICT in supporting efforts to achieve the anticipated SDGs (Supreme Planning Council, 2019).

In a recent development, the Omani government signed a contract with a satellite Internet provider to cover around 600 rural villages and 141 schools with fixed telecommunication and Internet by the last quarter of 2020 ("TRA signs agreement with Oman Broadband Company," 2020). This coverage aims to bridge the digital gap with the rural communities, enable access to the Internet and e-Government services, and support the e-Learning facility in Omani schools ("Internet Connection Agreement to 598 Villages via Satellite," 2020). As a result, the Sultanate became

almost entirely covered with telecommunication and Internet services. Furthermore, Sultan Haitham gave directives to grant higher education students who are in low income or social security groups free portable computers (laptops) so they can join the educational programmes that are delivered electronically or online by the upcoming academic year (2020/21) (“HM commands laptops supply for needy at Higher Education Institution,” 2020).

5.2.3. Justification for Selecting Oman as the Context of this Study

The context of this research is the Oman government. As noted earlier, Oman’s main revenue has mainly been from oil and gas exports. However, as a result of oil price volatility, the country is pursuing policies to diversify its economy in order to reduce its over-reliance on the oil industry. To support economic diversity, the Omani government has initiated the investment in ICT and e-Government solutions for efficient operations of public administration services.

Oman’s e-Government is in its initial stages and witnessing rapid development. In addition, the researcher had prior experience with e-Government development in Oman and good relationships with the officials there, which also facilitated access to the data. Although e-Government project failure is a global issue and does not particularly concern the developing world, shedding light on Oman’s experience in e-Government implementation was very tempting and has brought useful contextual insights which enriched the research area.

5.3. e-Government Development and Implementation in Oman

Drawing on the interviews held with key decision makers in ITA, the ITA website (<https://www.ita.gov.om>) and the supplementary documents which ITA had provided, this section describes, in brief, Oman e-Government strategy (e-Oman), its missions, goals, governance and policies, and implementation. While exploring the strategy, it is of vital importance to understand the emphasis given to data sharing and integration as a critical facilitator for enabling and streamlining e-Government services and operations.

5.3.1. E-Government Strategy (e-Oman)

e-Oman is a long-term (20-year) strategy that aligns with other strategic plans of the country. This strategy was launched in 2003 as part of the Oman strategic ‘Vision 2020’. The essence of e-Oman is to establish a solid foundation for a smart nation: a nation that relies on using pragmatic digital technologies to enhance the quality of life for the society and enable an efficient, cost-effective, and highly productive public and private sector. It has been anticipated that Omanis will be capable of leading the transition of the country towards becoming a smart nation and will possess the knowledge, skills and tools required to transform the Sultanate. The infrastructure will be enhanced and modernised to fit transformational needs and enable the various economic sectors towards achieving the economic diversification goals, partly through technology (ITA, 2018b). e-Oman has a set of established goals that contribute to the diversification of the Omani economy. These goals have been stated as (ITA, 2018c):

- Leading and facilitating the transition to a digitalised economy,
- ICT job creation for Omanis,
- Making life easier and more convenient for citizens,
- Increasing contribution of the ICT industry to the economy, and
- Encouraging government entities to complete the digital transformation plan.

e-Oman has been focused on seven key perspectives aiming for e-Government development as well as developing ICT capacities of digital society. Specifically, e-Government development and smart services, ICT infrastructure, IT security, society competency building in ICT, developing IT industry through finding Omani private sector organisations, IT governance (policies, standardisations, and regulations) and ICT/e-Government awareness. Every perspective has its own initiatives that work toward achieving the vision of the strategy.

The execution of e-Oman, including the development of Oman e-Government, has been delegated to ITA, which was founded in 2006 and set up by a Royal Decree as part of Oman digital strategy (ITA, 2018b). ITA is responsible for implementing national information technology infrastructure and overseeing projects related to the implementation of e-Government in Oman, while, at the same time, providing professional support to other e-Government initiatives in the country. Moreover, ITA takes the lead in enlightening the Omani society with required digital literacy and

competence through training and innovation centres, as well as through awareness campaigns (ITA, 2018b).

The strategy includes executive short-term plans, each five years long. Every plan has specific targets, initiatives, and milestones. The timelines of the strategy, as described by the ITA Director General for e-Government Services (DGeGS), are:

- 2003-2006: Developing the scope of the strategy and creating the overall vision. During this period, ITA started the execution of the strategy, focusing on the seven perspectives (described above) by dividing the initiatives into two main parts, primary and secondary. The primary initiatives are carried out by ITA itself, while the secondary ones are led and executed by government/public organisations. At the same time, ITA is committed to providing the needed support to the secondary initiatives to achieve an integrative institutional work between ITA and the organisations concerned.
- 2007-2011: The focus was mainly on the perspectives of preparing the basic IT infrastructure for government organisations, to be used for providing systems and services development, and society competency building. The goal of this period was to prepare society for a transfer to a sustainable digital economy. This period witnessed increasing adoption of ICT, improving services provided by government organisations, boosting business industry, as well as facilitating the daily life of citizens. During this stage, ITA founded the national data centre and, later, the government cloud data centre (G-Cloud) to cope with the emerging technologies and international standards. Other primary initiatives, in this respect, were the development of an e-Payment portal to allow electronic transactional payments, and the Oman Government Network (OGN), which is a private network based on MPLS technology to provide fast and secure connectivity among government organisations, the IT security framework and the integration platform to facilitate inter-organisational integration and feed in shared e-Government services. On the other hand, competency building included professional training for government employees, as well as for the public to bridge ICT gaps and digital divides with technology.
- 2012-2020: In 2012, the plan for e-Government transformation was announced. It was expected that, within three years, government organisations would have been sufficiently ready. Recently, ITA also worked forward to provide high-speed

broadband and fibre connectivity by cooperating with the government-owned broadband company, 'Awasser'. This broadband network will gradually replace OGN to improve the quality of connectivity. This was expected to be achieved by the end of 2019. The Public Key Infrastructure (PKI) and digital signature was also implemented in this period to build high security around electronic services and transactions of government organisations. To avoid PKI complexity barriers that could arise from its adoption, ITA provides multiple channels for activating PKI user/entity registration. These activation channels are made available and affordable. This had reinforced the security of the national IT infrastructure. Moreover, one of the initiatives in this period was the establishment of the Oman e-Governance Framework (OeGF), which is described in Section 5.3.3.

5.3.2. E-Government Implementation Policies and Governance

One of the ITA initiatives is the establishment of an open data policy. As government agencies transform their processes and public services into e-Services, they produce and update a huge amount of data electronically. Open data policy implies that this data should be made available to the public and organisations to access, reuse, and redistribute without any restrictions (ITA, 2018a). ITA has defined the open data policy for government organisations to set out best practices on how they publish data on the Internet in a structured and interoperable manner.

On the other hand, there is still no data/information sharing policy defined yet at the national level. However, government organisations are encouraged to establish their own data sharing policy, on inter-organisational levels, while sharing common data or services. Nevertheless, ITA is working towards establishing an enterprise data sharing policy at the national level which will govern how data are shared among government organisations. ITA is currently working on data standardisation as a step before establishing the data sharing policy. This includes issuing the law of electronic transactions, the law of electronic crimes and regulations of using ICT, and the law of using personal information. The latter is currently under review by the Ministry of Legal Affairs (MOLA).

At the projects level, there are different types of e-Government projects, which are classified as institutional projects, national projects, and central initiatives.

Institutional projects are those limited to a single/local government organisation such as correspondence management system, back-office automation, ICT infrastructure projects, etc. National (i.e., inter-organisational) projects are those involving multiple organisations and intensive integration architecture, similar to the projects being investigated by this study (e.g., e-Census2020, InvestEasy, AMMS). Central initiatives are those dedicated to infrastructure or interoperability frameworks, such as OGN, G-Cloud, PKI, etc. (ITA, 2018a).

Every e-Government project involves governance, funding and monitoring based on the type and scope of the project. Project governance comprises structures, frameworks, processes, and tools to ensure that project objectives are achieved within the budget and planned timelines. Project management involves the following governance structure (ITA, 2018a):

1. Project Sponsor to provide strategic direction and accountability throughout the lifespan of the project.
2. Steering Committee of key stakeholders, which acts as the escalation point for any project deviations and provides directions to overcome project issues.
3. Project Management Office (PMO) to create consistency among all projects and to monitor risk, quality, and project timelines.
4. Project Team to execute the project following the objectives set by the project sponsor, steering committee and PMO.

With respect to e-Government projects funding, ITA has its own independent budget which is dedicated to its initiatives of e-Oman execution, whereas projects managed and executed by other organisations are funded from those organisations' own budgets or by different means. According to the DGeGS, every government organisation sets its own e-Government plan with the guidance of ITA. In this sense, ITA reviews all plans and consolidates them into one master plan with funding requirements. The plan is then forwarded to SPC for discussing funding. However, due to shortages in the budget at present, SPC has instructed all organisations to fund their own projects internally as far as they can. As a result, many e-Government projects have been suspended. Subsequently, a national forum, called 'Tanfeethe,' was recently held to discuss the funding issue and find alternative ways for funding the projects. New mechanisms were then suggested to support e-Government projects based on the annual revenues of government organisations, especially the public service providers.

One mechanism was to allocate 4% of annual revenues in the respective organisations to projects. Another mechanism was to seek support from private sector organisations to sponsor projects through public or private partnership investments. However, budgeting remains a challenge, and there are still organisations that perceive budgeting as a barrier. The other issue is the lack of efficient project management and leadership personnel in some organisations, which affects the transformation progress.

e-Government projects are constantly assessed and monitored by means of keeping track of all project-related metrics including team performance and task duration, identifying potential problems, and taking corrective actions necessary to align the projects with scope, budget, and the targeted deadlines (ITA, 2018a).

5.3.3. E-Government Implementation Frameworks

As part of the e-Government strategy, ITA had established the Oman e-Governance Framework (OeGF) which is a set of standards/best practices and process management system for managing and executing e-Government projects and enhancing the delivery of public services. The framework spells the rules and procedures which ensure that government IT projects and systems sustain and extend ITA's strategies and objectives. It is also intended to provide assurance about the value of IT, provide a framework for the management of IT-related risks and put together controls to minimise risks and ensure better delivery of IT initiatives (ITA, 2018c). Figure 5.1 presents OeGF and its components. From the technical perspective, one key component of OeGF is the Oman e-Government Architecture Framework (OeGAF). OeGAF serves as a guide to the development, deployment, and operations of information systems of the Omani government entities. It contains the principles, strategies and building blocks that support the goals of the government. The architecture can direct the selection, use and operation of technologies needed to support government business requirements and delivery of services. It can also reduce the time and cost of deploying applications while making it easier to integrate information and services. OeGAF is intended to help the Government to act as an 'Integrated Enterprise' and manage IT as a strategic investment (ITA, 2018c).

Moreover, OeGAF includes a reference model for government information sharing called Government Information Sharing Framework (GISF), and a data integration platform called Enterprise Service Bus (ESB). These two artefacts are described next.

5.3.3.1. Government Information Sharing Framework

While different stage models exist to assess the level of e-Government development, all models agree that the highest maturity level is the horizontal integration where government organisations can share information. Information sharing is a key capability required for a one-stop and networked government, responding to a variety of cross-national needs like sharing service-related information between parties involved in the delivery of seamless services. Appropriate information sharing will improve the outcome for clients and the community through more integrated services and increased operational efficiency. GISF was developed to standardise information

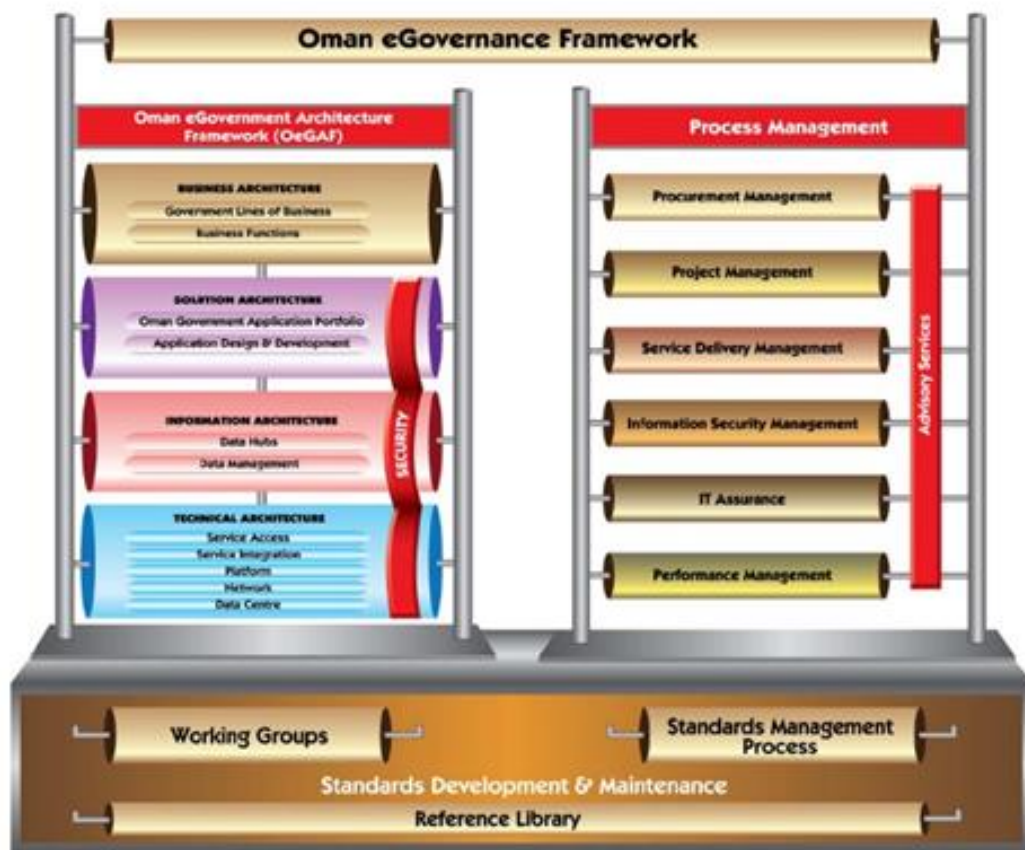


Figure 5.1: Oman e-Governance Framework (ITA, 2018c).

sharing and integration of e-Services across government organisations. The framework provides technical references for government agencies required to establish standard information management practices. ITA has offered an integration

platform as a service to government entities facilitating standard and seamless integration (ITA, 2018a).

5.3.3.2. ITA Integration Platform: Enterprise Service Bus (ESB)

All online services and any solution, independent of the applications used by an organisation, can be integrated through the ITA enterprise integration platform, ESB (ITA, 2018a). The platform acts as a centralised data hub through which government organisations can connect to share and exchange data. The data being shared so far are from three data domains, which are personal, commercial and census data. These data are the common data that are needed by most government and non-government organisations to run their e-Services. Currently, there are more than 36 government organisations connected to ESB, some of which provide services, and others are consumers of these services.

Normally, policies implemented in the integration platform are controlled by data owners/providers who determine who access data and the particular format and standards for data access. Additionally, there is a contract that must be signed by the data sharing parties in which responsibilities of every organisation and lists of people names, who can directly access the data, are agreed upon. Data security is maintained through network-level encryption over OGN connection, and there are IT security rules imposed during data transportation. Additionally, ESB provides transaction logs, and data request traffic is monitored to spot all kinds of abuse on both levels of information systems and data.

Technically, ESB utilises an open integration architecture which is a sort of enterprise application integration (EAI). ESB links government organisations together using open standards so that all can communicate with all. The application platform uses Java-based middleware running on the 'JBoss Fused Service Manager' integration bus, which is an open source, licence-free software. The adoption of open source software was motivated by the financial shortage in the national budget. Data sharing interfaces are developed and deployed in the hub using the Webservices technology framework. The use of Webservices is a prerequisite for service deployment to ensure interoperable connectivity among the information systems of the sharing parties. ESB does not store data, but rather performs network routing to pull and push data from

and to information systems in the respective organisations. It provides mechanisms to deal with data management, mapping, and exchange between various parties.

5.3.4. Key Challenges Facing e-Government Implementation in Oman

Concerning the challenges facing the execution of e-Oman and e-Government implementation, the researcher had questioned ITA professionals from various levels (i.e., executive, management, and operational levels) and inspected the other available data sources to identify these challenges. While ITA demands the highest levels of implementation standards, there have been some concerns about security, integration, and interoperability. Some of these concerns are (ITA, 2018a):

- Lack of technical capabilities to implement the required configuration,
- Achieving the highest levels of security measures,
- Ensuring that shared data between government organisations are used within the legal boundaries and with the utmost level of confidentiality,
- Failure of some organisations to configure their systems to the required interoperability standards with the integration platform (i.e., ESB).

In this sense, the DGeGS had expressed his view regarding these concerns, and other challenges, when interviewed by the researcher. One of the issues, pointed out by the DGeGS, was that organisations are still in transition from a traditional state to a digital state where inter-organisational integration had not so far been achieved and the old mindset in organisations had not yet completely changed. Some organisations are led by old mindset decision makers who do not realise the importance of change, and still think that e-Government implementation (e-Transformation) is solely an IT department business. The new mindset needs time, and the change might also have been enforced to expedite the transfer. The DGeGS commented:

“Despite the mandates of e-Transformation, the challenge of readiness coexists, and some organisations are still not in a good readiness.”

Another challenge is funding. However, ITA has been working with the government to give priority of funding to the key service organisations who cannot self-fund their e-Government and IT infrastructure projects. However, a lack of human capital in IT was observed.

Nevertheless, all e-Government national level projects have been planned to achieve a satisfactory level of data digitisation and business processes automation as a mandate. As a result, in the data dimension, an acceptable level of data digitisation has been achieved with few challenges, whereas in the process dimension, process reengineering had been emphasised. However, current organisations' culture tends to resist the change, where one of the organisations' concerns is to protect their services and keep them internal. Nonetheless, there are some good examples on the ground of a successful e-Transformation that have met the expectation on both dimensions, such as the InvestEasy initiative in MOCI. This is one of the national initiatives of the e-Oman strategy. The DGeGS noted:

“The integration platform in this initiative had been in place but not fully activated and the reason is not technical but the mindset, regardless of the mandate from the Cabinet.”

Although the integration platform, ESB, had been in place, some organisations still prefer to connect point-to-point with other organisations which might create a massive number of connections and, thus, maintaining them becomes overwhelming. Such a lack of enterprise thinking was highlighted by the DGeGS as he confirmed:

“There is a lack of institutional and enterprise vision.”

Likewise, the Director of Integration Department (DID) expressed his view concerning inter-organisational integration. He stated that the integration platform (ESB) had emerged as a result of the failure of implementing the e-Oman Portal, which was meant as a one-stop-shop for all e-Government services. The idea of the e-Oman Portal was to integrate government organisations into shared services. However, at that time this could not be implemented because organisations did not wish to integrate with the portal. At the same time, ITA did not have the authority to enforce portal integration. Thus, every organisation created its own service portal. Currently, this portal is just a website for general information. Lack of ITA authority over government organisations to force certain integration standards led organisations to impose their own integration practices. This also made security requirements diverse and very challenging. Another reason is the lack of awareness in organisations, and that there was little demand for integration at that time because few or no services were requiring intensive integration.

Having set the context of the empirical study and reviewed the e-Government strategy in Oman and identified its overall integration challenges, the upcoming sections take the analysis further to the organisation and cross-organisational levels to explore and understand the various effects of the socio-technical factors on the e-Government implementation in the three case organisations, and their respective e-Government implementation projects, selected for this study.

5.4. Case Study Analysis: MOMP

This section presents the findings of the study conducted at MOMP. The process of investigating the effects of socio-technical factors on e-Government implementation and its success at MOMP was carried out using the outcome of two methods of data collection: semi-structured interviews and document analysis. The interviews were conducted with ten MOMP participants from three organisational levels including top management, project managers and technical specialists, as shown in Table 5.1.

MOMP Case Study	
Management Level	Number of Interviewees
Top Management	1
Project Manager	1
Technical Specialist	5
Vendor	1
Private Agent	1
Citizen	1
Total	10

Table 5.1: Types and Number of Interviewees at MOMP

All the interviews were tape-recorded. The interviewing process started with the focal point of this organisation, whose position was Director General of Information Technology (DGIT). Then the snowballing technique was followed to identify the rest of the participants. All the interviews were transcribed, translated into the English language (for those conducted in Arabic) and reviewed by the researcher before analysis. The documents were collected during and after the interviews took place. They were used to support the findings of the interviews and to collect background and contextual information about the case organisation.

5.4.1. MOMP Background

MOMP is a government organisation that was established by the Royal Decree number (108/2001). The ministry proposes and implements manpower general policies in Oman, in line with the state economic and social objectives (MOMP, 2018). The main goal of MOMP is the preparation of draft laws and systems regulating the labour market and vocational training sector in Oman.

MOMP responsibilities cover two major divisions of the Omani social sector, namely the labour division and the technical and vocational educational division. Furthermore, the ministry has private brokers distributed across the country who offer intermediary transactional services to the citizens, on the ministry's behalf, such as 'Sanad Service Centres'. However, MOMP aims, in the near future, to offer online self-services that do not involve third parties.

5.4.1.1. e-Government Implementation and Readiness Status at MOMP

MOMP had started e-Government transformation by the end of 2012 according to the transformation plan set up with the guidance of ITA and e-Oman strategy. The vision of the plan states that all the services should be online, and they should be zero visits from the clients to the ministry. This entails that MOMP services should be running 24/7 anywhere, anytime. MOMP had been working toward integrating its electronic services with the other associated organisations to reduce paperwork and check data validation immediately and online from its source.

Prior to the setup of the e-Transformation plan, all MOMP departments had been operating in isolation with little offline data sharing. They were only a few systems in the ministry at that time, while local regional branches were connected through leased lines. Later on, MOMP developed the plan, and documented all its services and classified them as internal and external processes and/or services. To this end, the external services have been given priority to align with the vision (i.e., zero visits). As a result, MOMP prepared the human resources and IT infrastructure, and communicated with its stakeholders to plan and scope the targeted e-Services. However, the very first online service was partially complemented by physical visits (personal contact) for the sake of document collection.

Yet, the ministry has been connected electronically with several organisations which provide sets of data by their legacy systems. It had already been integrated with ROP, MM, The Public Authority of Social Insurance (PASI), MOCI and The Public Authority of Manpower Records (PAMR). However, more stakeholders have been joining the integration because of the AMMS project (described in the next section).

The main driver for inter-organisational integration was the e-Transformation plan. However, in the beginning, most government entities lacked infrastructure and personnel readiness to integrate using Webservices. This caused delays and slowed down the development of e-Services. Recently, most stakeholder organisations had started to upgrade their infrastructure and systems. Thus, most MOMP services now are running online. The demand from MOMP for external data compelled other organisations to upgrade and raise their e-Government readiness. Currently, Webservice is the standard technology used for inter-organisational integration. While MOMP is seen in a high level of technological and e-Government readiness, MOMP participants argued that inter-organisational integration has been moving slowly. One of the main reasons behind their argument was that ITA has not been devoting enough support to government organisations. Table 5.2 presents a historical review of e-Government evolution at MOMP and inter-organisational integration with the other respective organisations.

Timeframe	Achievement
Up to 2013	First electronic inter-organisational connection with PASI for validation of business rules for social insurance inspection.
2014 to 2016	<ul style="list-style-type: none"> - Integration with ROP and PAMR for validating labour visas through work permits. - Integration with MOCI and Oman Chamber of Commerce and Industry (OCCI) to eliminate paper-based transactions related to commercial certificates. - Integration with the Central Bank of Oman (CBO) to check salary transfers for private sector employees and validate them against work contracts. - Online provision for job vacancies and applications service in the private sector through MOMP e-Service Portal.

		- Integration with the national e-Payment Portal for electronic payment transactions, and with the PKI to identify online users' identity and secure electronic transactions.
2017 present	to	- MOMP opened channels to interact online with its clients to assess their satisfaction with services, and the way to further improve them. - Number of integrations with other public organisations reached 27.

Table 5.2: e-Government Development at MOMP

Meanwhile, MOMP has been working toward making all services fully automated, where decisions are systemised. Currently, 40% of MOMP applications are auto-approved by leveraging the benefits of internal and external integrations. An example of auto-approval is the request for private clearance (e.g., requesting personal drivers or housemaids). Decision makers' role now has been shifted more toward planning. The ministry is eager to achieve equality, transparency, and public satisfaction. In the coming five years, the vision is to make all MOMP services online with very minimal human intervention. This would transform the ministry into a nearly virtual organisation.

5.4.1.2. The AMMS Project

The Advanced Manpower Management System (AMMS) project aims at developing a broader framework for managing the expatriate labour force more effectively by relying on a set of tools and procedures that enable the processing of business work permits electronically. The project is a collaboration and a collective decision between MOMP and ITA. It was driven by the enormous economic and social impact on the private sector organisations and citizens. It is one of the biggest e-Government transformation projects in the country, with around 28 organisational stakeholders from the public and private sectors. Stakeholders' representatives in this project included members from different public and private organisations, such as decision makers like ministers, CEOs, director generals of information, IT directors, project managers, IT service managers, suppliers, and others.

The AMMS project has been aligned with e-Oman national strategy. This project is heavily dependent upon inter-organisational integration. The AMMS system has been integrated, so far, with 26 government organisations that are in relation to MOMP services. These are either beneficiaries of MOMP services or data providers. They

include PAMR, MOCI, ROP, PASI, and others. The integration efforts, in this project, started with MOCI in 2014 to identify commercial certification numbers (CCN) and data of authorised members. In the past, business owners used to fill a paper form regarding the CCN. After the integration happened, it was announced that there was no more paperwork and, hence, this part of the service has become fully electronic. All AMMS implementation activities take place inside MOMP by collaboration and coordination with the technical teams of government organisations. The AMMS project had undergone multiple stages described as follows.

In 2014, MOMP teamed with ITA and consulted a Singaporean firm to prepare a full study to reform the labour clearance services and investigate the issues relevant to the electronic inter-organisational integration and data sharing, and the way to improvements. Thus, a consultant report and a project proposal were produced.

From late 2014 to 2016, the implementation was delayed due to the financial crisis and shortage in the government budget.

In 2017, the implementation was officially initiated. The implementation has been led by 'Nortel', an Estonian firm which is specialised in e-Government implementation. Based on the consultant report, Nortel performed an analytical study for the current state (as-is) and the future state (to-be). That study engaged the business stakeholders (business owners). Then work teams were formed jointly from MOMP and ITA to launch the implementation stage.

The implementation in AMMS had been carried out in consecutive stages, matching specific milestones. The implementation is now in the fourth stage. However, there have been a few challenges where integration with all stakeholders has not yet been achieved. For example, the integration with the Ministry of Health (MOH) and the Ministry of Higher Education (MOHE) did not succeed for various reasons, as will be described afterwards in Sections 5.4.3.2 and 5.4.4.1.

The full development of the AMMS system has been carried out in-house, and the funding needed is part of the development budget of the ministry. Although MOMP makes an annual request to fund the development, there is no lump sum blocked for the project. However, there has been no major financial issue in this regard.

The AMMS project contributes significantly to the facilitation and simplification of the government procedures, enhancing transparency and promoting services. It is also anticipated to reinforce the development of the national workforce needs, fulfil the objectives of ‘Omanisation’ (i.e., replacement of foreign workers with Omanis) and reduce the number of job seekers.

Since the unit of the analysis in this study is e-Government implementation projects, the next three subsections (5.4.2 – 5.4.4) investigate the effects of socio-technical factors on the implementation of the AMMS e-Government project. These factors have been subdivided into three dimensions, which are environmental, organisational, and technical.

5.4.2. Analysis of the Effects of the Environmental Factors on e-Government Implementation and its Success at MOMP

5.4.2.1. Pressure Forces

- **Institutional Isomorphism**

The implementation of the AMMS project was influenced by a strong coercive institutional force, which is the mandate of e-Oman strategy supported by the direction of His Majesty, Sultan Qaboos, and the Cabinet as a sponsor of the project. The Cabinet also follows up on the progress of this national strategic project. In this respect, the Head of Data Centre Management (HDCM) at MOMP, while responding to the coercive forces’ inquiry, pointed out that the implementation was driven by the said forces. The HDCM described:

“The transfer to e-Government services... there was external pressure from the Cabinet. The directions of His Majesty, Sultan Qaboos motivated us to do the project as part of the e-Oman strategic plan.”

The expectation of the stakeholders, particularly those who are direct beneficiaries of MOMP services, had also driven MOMP to improve the way things were done, speed up and simplify the processes of dealing with stakeholders’ transactions, given the emergence of e-Government and the global diffusion of e-Services. The HDCM added:

“There was high pressure from the stakeholders for improving the ministry’s services.”

Another influence was the socio-economic impact anticipated by citizens and the private sector organisations, dealing with the manpower labour force, which acted also as a motivator. This influence had exerted a normative isomorphism on MOMP decision makers and professionals to work towards improving the labour force clearing services. Such normative pressure force was indicated by the DGIT, as she stated:

“It was driven by its enormous impact on the private sector organisations and citizens, economic and social impact.”

Moreover, the MOMP minister’s vision with the internal desire of MOMP senior management to enhance the services and achieve the strategic vision, delineated by e-Oman, has driven the ministry to establish electronic integration with its key organisational stakeholders. Service availability, paperwork reduction and data quality were among the anticipated objectives. The DGIT described how the minister’s vision influenced the implementation:

“Our minister’s vision says that all the services should be online, and there should be zero visits from our clients to the ministry, and that our services should be running 24/7 anywhere, anytime.”

- **Media and the public**

The media play an important role in diffusing the public services of the AMMS project. MOMP professionals had been using different media channels to inform the public and the broker offices about the newly launched services, and disseminate awareness about the benefits of using the new electronic applications by availing themselves of the self-services in the ministry’s portal or through the brokers’ offices. In this regard, the AMMS project manager (APM) noted:

“We also hold media campaigns to let citizens be aware of the new services and describe how to use them.”

Although MOMP professionals consider the media and the public as very important sources of feedback and service improvement, the DGIT commented that such pressure force was not a key driver in initiating the AMMS project, even though MOMP considers every feedback, whether positive or negative. The DGIT noted:

“In general, people’s comments are very important, but they are not the driver. The driver is work improvement. However, we are always happy to hear positive comments and take them into account for further service improvement. Even in the case of negative feedback, we consider it and look at the issue and analyse it. So, if there’s room for improvement, we go for it.”

From the participants’ voices, it was understood that MOMP had always been under the public spotlight and societal pressure. In general, society expectations are high, and this causes huge pressure on the ministry. Every community group has its own interest, for example, job seekers think only about jobs and business owners want expats. This is a cultural stance, because people tend to talk about their wants, but such a thing may not always contribute to service improvement. According to the DGIT, from a service development perspective, MOMP tries its best to make things easy for the people and hear more from them. To hear every voice, the ministry took the first step to integrating all social media accounts into a single window so that all opinions could be viewed, gathered, and synthesised for further consideration. The implication of media and the public had changed the strategy of service planning and sustainability, as the DGIT indicated:

“In the past, our strategy in service improvement was inside-out, now it has changed to outside-in while giving much attention to the media and the public. We started planning for creating a single hub for all social media platforms so as to put all opinions together and avoid deliberate neglect of any opinion.”

- **Economic Conditions**

The government budget status and the global financial crisis had, somehow, affected the implementation of the AMMS project. As a result, the launch of the project was subsequently delayed for about three years. The APM described the impact of the budget on the project timeline:

“From 2014 to 2016, the implementation was delayed due to the shortage in the government budget.”

The same was indicated by the DGIT, who stated that budget shortage was one of the challenges while establishing inter-organisational electronic integration with some participating organisations:

“Integration hasn’t been an easy task. We face challenges like ... insufficient budget.”

Likewise, the HDCM argued that the economic status might have indirectly affected the project, where other supporting aspects, such as recruitment, paid training and monetary incentives, had been suspended. He reported:

“We had [training] in the past, but currently the budget doesn’t support ... Financially, [the budget] might not have affected the project directly, but paid training, bonuses and new employments have been suspended.”

5.4.2.2. Policies and Legislations

- **Institutional Legitimacy**

The findings of the interviews revealed that there was no set of laws that give direct legitimacy to MOMP to actively engage in collaborations and data sharing activities among other organisations. Nevertheless, a few informal mandates were noted. For example, the Cabinet may impose using specific data standards like using the key identifier or ID number, and business registration number of every organisation concerned with these data, which gave informal legitimacy to MOMP to request such data. Moreover, as MOMP had been executing the national e-Transformation plan, which is part of the e-Oman strategic vision, frequent circulation letters were being published by ITA to use specific standards and follow up certain instructions. These instructions were perceived as mandates that all organisations should adhere to and thus were advised to collaborate if anything needed to be shared or articulated. In addition, as indicated by the DGIT, every inter-organisational collaboration entails further communication and may involve meetings and internal agreements. With respect to AMMS, project committees were established in the governance structure, where the senior committee included the top decision makers from every participating organisation. Such a committee facilitates collaborations and requests for resources. However, the easiness of getting a resource like new data or information depends upon the degree of response of the respective organisation and its priorities. All these procedures take time and can cause delays to the project. This was made clear by the DGIT where she stated:

“Financial requests go through the senior committee, and from there, the minister then communicates with the Ministry of Finance. The culture of sharing

or exchange of human resources among organisations does not exist here in Oman.”

The informal legitimacy in MOMP was also given to the private brokers (e.g., Sanad offices) as an option to serve the citizens on behalf of the organisation. These privileges include granting permissions for initiating and renewing labour contracts and collecting service fees. Such a thing was clear in the interview with one of the private brokers, as he mentioned:

“We serve citizens in a number of services, like permission for bringing foreign labour; initiation and extension of labour’s contracts... we collect fees, and we get commissions from MOMP. For example, the fee for the initiation of a labour contract is OMR 141, we get OMR 18 out of this.”

The same was also confirmed by a citizen who had availed himself of the labour permission service. After receiving his worker, he was asked to contact MOH and ROP to do the medical test and extract the residency card:

“After I received the housemaid, I was asked to contact an MOH agency for the medical fitness test, and ROP for getting the residency card for her, using Sanad smart forms.”

- **Regulatory Frameworks**

The AMMS project had various organisational stakeholders, some of whom are involved in the data sharing, and the others are users or beneficiaries of the system services. Therefore, for effective implementation, legislative frameworks for data sharing and access policies are critical. Nevertheless, the interviews with the participants concerned did not identify such policies or legal frameworks.

Despite that, ITA has established policies for electronic transactions and open data as part of OeGF, while the MOMP officials were not fully aware of such policies. For example, the DGIT when questioned about whether the ministry follows the electronic transaction policy, responded:

“We are not aware of such a policy. However, we are aware of e-Transformation strategy (e-Oman) and we try our best to align with it, and I guess this policy is in it.”

The rigidity of legislation also acted as a barrier to the transfer and hence affected the implementation and the overall process flow. A single rule normally takes ages to be changed. A System Programmer (SP), who was a member of the implementation team, touched on this issue by commenting:

“Legislative regulations are rigid and not easily changed.”

The SP demonstrated an example of the rigid regulation that did not support the application of the commercial law in e-Government. One of the respective issues that arose was that private lawyer offices were not allowed to practise as business firms. While this was a major requirement (i.e., a business rule) in the AMMS, it conflicts with the commercial law, which does not allow business registration of lawyers’ offices. This legal conflict was noted by the SP:

“Another example is our integration with the Ministry of Justice (MOJ). The MOJ, by law, does not allow the commercial registration of solicitor offices in MOCI as a commercial certificate. However, one of our major requirements is that any private organisation must be identified by a commercial certificate in the system. This is under discussion, but it is taking time.”

5.4.3. Analysis of the Effects of the Organisational Factors on e-Government Implementation and its Success at MOMP

5.4.3.1. Managerial Capability

- **Leadership and Support**

AMMS is a national initiative and had received substantial support from the Cabinet, which is the highest authority in the Oman government. Such support offered MOMP management a strong potential to run the project and gain autonomous leadership. This was evident from the voice of the interviewees during the conduct of this study. For example, the AMMS project manager (APM) summarised her role in leading the project by stating:

“My role can be summarised as following up project progress, stakeholders’ and vendor’s requirements, coordination of meetings with government organisations regarding integration and reviewing, approving deliverables and documentation from the vendor, and communicating with the management.”

Regarding management support, the APM highlighted the powerful support received from the higher authority of the project. She asserted:

“We have high managerial support from MOMP top management.”

This argument was further supported by the DGIT, who stated:

“Managerial capability is high since we have strong support from the level of ministers.”

Moreover, the members of the steering committee of the AMMS project, which included ministers and undersecretaries from the various government stakeholders, meet regularly to push the project further, expedite decisions and resolve any emerging issues. The APM noted:

“The higher committee and steering committee members meet monthly; the operational committee members meet biweekly. Higher and steering committees provide managerial and financial support when needed. This includes communication with the external entities to expedite works of integration.”

The project execution team, which was also given extended privileges, was empowered to decide upon other issues that needed quick decisions. This decentralisation of the decision making helped the project to hit the planned targets and meet the designated milestones. This was articulated by the DGIT, who led the overall implementation of the project:

“Our team is empowered from the top management to work and integrate with external parties, and there is an agreed set of data which are approved to share outside. We just need to inform the management and request support when necessary.”

- **Strategic Planning**

The AMMS project is one initiative of the e-Oman strategic plan. This was confirmed by the APM as he stated:

“Our AMMS project is aligned with e-Oman national strategy.”

Accordingly, MOMP vision on this enterprise project was to transfer all public services to a package of electronic services while offering online self-service facilities, round the clock, to the respective clients. The ministry also aimed to substantially

reduce paperwork and increase the quality of the data. The DGIT highlighted this strategic vision by noting:

“We try to integrate our services with other participating organisations to reduce paperwork and check data validation immediately and online from its source.”

The DGIT also confirmed their strategic vision in short- and long-term planning, by stating that their short-term goal was to put all the ministry services online, and their long-term plan was to transfer the ministry to look like a virtual organisation with zero contact while preparing its human resources to attend this transfer. She asserted:

“In the coming five years, our vision is to make all our services online with minimum human intervention. We are intending to transfer the ministry into a virtual organisation... So, we prepared our human resource and IT infrastructure and communicated with other stakeholders to plan and scope e-Services.”

In practice, MOMP hired an international consultant to help the ministry turn the above vision into a set of achievable objectives by establishing certain key performance indicators (KPIs). The project manager of the implementation vendor (VPM) briefly described the implementation of the strategy:

“There was a consultancy project with around 20 integrations planned. It had certain KPIs related to MOMP and service performance. We studied the as-is situation and designed the to-be business processes.”

5.4.3.2. Structure and Culture

- **Organisational Structure**

One of the organisational structure issues that occurred due to cross-organisational boundary borders was that of functional silos. It was found that every stakeholder organisation participating in the project, had its internal agenda where the focus was on its own priorities. Thus, their duty in the AMMS project was treated as a side job. The issue of the functional silos was highlighted by the VPM and the SP. To this end, the VPM argued that ministries (i.e., participating organisations) tended to preserve

their own data and focus on their internal plans, regardless of government directions, as he stated:

“Ministries are still very focused on protecting their own data. There might be some political issues, not about bad intentions but simply following internal development plans for their IT solution.”

Similarly, the SP showed another example of how cross-organisational structure caused functional silos that affected the integration of the AMMS with one of the key stakeholders, which was MOH. The SP described how MOMP was not able to integrate with MOH because MOH had concentrated on an internal project that had almost consumed its resources. She commented:

“... we failed to integrate with all stakeholders, e.g., MOH, because they have limited resources as they are geared towards their G-Cloud project, and they are managing hundreds of health centres and hospitals. They want to consolidate their relevant IT centres into a single (G-Cloud) centre, but they are facing many issues such as funding.”

- **Organisational Culture**

Regarding culture, most of the informants agreed that some organisations had been sticking to old procedures, especially those with low technological readiness and/or in the early stages of e-Government transformation. In this respect, the DGIT believed that old mindsets were a persistent challenge that confronted the AMMS project. For example, she indicated that some staff of those respective organisations tend to ask contacts for paper documents even though all needed information is available electronically and up to date:

“Nevertheless, paperless was a challenge because some staff didn't stop asking for paper documents, as they used to do in the past.”

On the other side, organisations that were advanced in technology and had been offering e-Government services, even though designated to act as data providers, were more willing and open to share data with others and had been proactive in promoting the use of the latest technology. The VPM gave an example of this kind of culture:

“The perspective of MOMP is to provide services which require data to be shared from and to other organisations... From this perspective, there is a clear

mindset. I tend to appreciate what has been done and this is definitely working with the key stakeholders like ROP and MOCI.”

- **Organisational Politics**

The interviewees revealed the existence of some organisational political issues, which arose during the implementation of the AMMS project, due to conflict of interests among the various groups, and the perception of organisation members toward the implementation. One of the influential issues in this regard was the middle management interference in the project decisions. The project caused a shift in the power of middle manager roles because of process automation and the emerging changes. The DGIT noted that middle managers in MOMP resisted change or used the power of their position to influence the decisions being made. She commented:

“Middle managers tend to resist the idea of the project as their power is shifted away.”

The APM clarified this issue further by explaining how middle managers influenced the process of decision making and attempted to control the project outcomes. This influence had also impacted the project communication plan and compelled the project manager to over-report project progress, which in turn put more burden on the project manager and slowed down project execution. The APM reported:

“Another issue is that middle managers usually interfere to control project outcomes and act as a middle layer between the project manager and top management, which creates conflicts and slows down the process of decision making. It also creates overload for me to report to multiple points of reference, even though there’s a communication plan for the project, but this is not being followed in reality.”

Another form of political context was the pressure exerted by the MOMP brokers (e.g., Sanad offices). These brokers tend to reject the idea of converting MOMP services to online self-services that are led by citizens. The brokers worked toward preserving their interests on the fees they collect when they act on behalf of citizens. The HDCM pointed this out and stated that this issue represented a challenge against the efficient implementation of the AMMS:

“Our challenge is the Sanad offices, they still wish to collect fees from their contacts because they don’t want to lose their trade.”

- **Business Processes**

As indicated above, MOMP hired a consultant to assist the ministry in renovating the business processes with respect to manpower, either internally or cross-organisational. This effort was specifically reported by the VPM, as he noted:

“We studied the as-is situation and designed the to-be business processes.”

The ministry was able to automate a handful of the respective processes. As a result, an increasing level of internal efficiency was observed while MOMP officials worked toward realising the benefits of e-Government implementation such as equality, transparency and citizens’ satisfaction as described by the DGIT:

“The decision-maker's role has now changed to planning level. We are eager to achieve equality, transparency and people satisfaction.”

The DGIT elaborated that reengineering of the business processes (BPR) had positively impacted the transformation of the MOMP services by significantly changing the way the work had been done. She commented:

“Things have changed. The number of contacts was very large in the past. As we continue improving, only a few people physically contact MOMP. The impact of BPR was significant. We now have 62 online services. We gradually moved from counter-based services to self-service online and mobile-based, plus having 150 Sanad offices.”

Regarding dealing with the business processes of other organisations, it was reported that what had been designed does not exactly match the reality. Some organisations, specifically with higher readiness and maturity, were easy to deal with and convince for process redesigns, like the key partners like MOCI, OCCI, ROP and PAMR; however, others were difficult. Nevertheless, the inter-organisational integration and data sharing have improved but have not yet achieved the expected maturity level. The other thing was that the technological readiness of some organisations was poor, and thus, it was difficult to completely redesign the process and establish seamless integration with them.

- **Governance and Operations**

The AMMS project governance followed the OeGF devised by ITA which is based on standard practice. The DGIT noted:

“We are following a standard project governance.”

The DGIT, further, described the governance structure of the project by indicating that they had established a perpetual project management office (PMO) which is based on the project management professional (PMP) method following international project governance structure and a set of clearly defined responsibilities, activities and deliverables. The DGIT added:

“I am the project leader. We follow a PMO method, and we have a PMO perpetual department. The project also has two steering committees that meet every two to three months to discuss the status of the project. One steering committee includes undersecretaries from the various government stakeholders. The other one includes the ministers and CEO of ITA. The project is part of e-Transformation strategy initiatives. There is also a project management committee chaired by the MOMP undersecretary that meets every month. Every government and non-government stakeholder have defined roles and responsibilities.”

The same was contended by the APM:

“AMMS officially started in 2017. Work teams and committees were formed. There are three committees: the higher committee chaired by the Minister of MOMP; the steering committee, chaired by the Undersecretary of MOMP; the operational committee, chaired by the General Manager of Planning and Development.”

Similarly, the HDCM, while describing his role in the project, pointed out the project management method that was being used. At the same time, MOMP had been working forward to equip its project team members with PMP certification by stating:

“I worked in the PMO to follow up the standardisation of project management and execution according to the PMP method. We look forward to getting certified in PMP.”

These project management practices were also confirmed by the APM, who mentioned that the first two phases of the project were completed on time and that a certain project management control was imposed to maintain the quality of the project deliverables. She elaborated:

“In the meetings, we report the status of project progress, and the first and second phases of the project were launched on time. We also have a PMO team that provides governance and documentation of project activities and deliverables. The team is constituted of a PM from the implementation company, and another PM from the ministry, who is me. We follow up project progress, stakeholders’ and vendor’s requirements, coordinate with government organisations regarding integration, review and approve deliverables and documentation from the vendor, and communicate with the management. We also produce meeting minutes and follow up action points. All documents produced are reviewed and signed by the project team.”

Likewise, the SP asserted the adoption of these project management practices during the implementation and the activation of the inter-organisational integration between the participating stakeholder organisations:

“We have a full management system for integration developed in-house where we keep all Webservices that can be reused. Before launching any service, we give training to our staff, stakeholders, and service users. We launch services gradually; we start with a small number of users.”

However, one of the project execution issues reported by the project managers, the APM and the VPM, was the management of the resources. The APM claimed that the staff were not dedicated to the project and most of the time they were busy with their own daily job activities. On the other hand, the VPM argued that implementation success is solely about management, given that directions are set at the government level, which was pretty clear to have good integration between ministries, where many things had already been in place. He further commented:

“It is not perfect but good, with certain steps towards the integrated government. Now it is about ministries doing their job and properly implementing their IT solutions and offering the right services... So, it’s about management more than anything else.”

From the financial capability perspective, the project, as aforementioned, is a national e-Transformation initiative and had been sponsored by the Cabinet. Therefore, there was no major issue in funding the project core tasks despite the financial crisis and the delay period in the beginning. In this regard, most of the informants argued that the availability of humble financial resources had been a helpful factor toward accomplishing the implementation and hitting the project defined targets. For example, a Senior System Administrator (SSA) at MOMP, while answering a question about project funding, responded:

“There’s enough funding allocated from the Oman government to MOMP and there are no major financial issues.”

The APM shared the same view and pointed out that the AMMS project development tasks had been carried out in-house (i.e., inside the ministry), and that budget allocation had been on annual basis as part of the MOMP development budget. Despite a delay in initiating the implementation, the APM argued that there had been no major funding issue since the actual start of the implementation. She stated:

“The full development has been in-house, and the funding needed is part of the running cost. We make annual requests to fund the development. But there’s no lump sum blocked for the project.”

- **Motivations and Incentives**

Although AMMS is a national strategic project sponsored by the Cabinet, there was an unfortunate absence of rewards and incentives, in particular monetary rewards. There had been a consensus among the MOMP participants that no rewards were received or planned in the foreseeable future. For example, the APM was unsure whether they would be rewarded or not at any stage of the project. When asked about rewards, she suggested:

“Not at all. But there could be at the end of the project.”

Government regulations toward motivation and incentives are rigid and entirely inflexible. There were no arrangements for rewards included in the budget terms. It was noted by the DGIT that such things, nowadays, are difficult to obtain in the public sector. Also, no motivation or reward programmes are defined at the management

level. However, some project leaders like the DGIT worked to compensate their teams and staff members to keep them up and motivated. For example, the DGIT reported:

“Personally, I try to do my level best to keep my team/staff motivated, like offering flexible hours for work, letters of appreciation, offering training programmes. I also request contracted vendors to offer training opportunities to the staff.”

5.4.3.3. Facilitating Conditions

- **Networking**

The efforts and achievements in the project would not have happened without the socialisation amongst the stakeholders. In this sense, MOMP managed to make the project atmosphere encouraging and motivating to teamwork. The SSA described AMMS project environment locally and externally:

“... and the environment is very collaborative and encouraging both internally and externally.”

This kind of social environment did indeed pay off, however, in establishing inter-organisational integration. The APM noted how the collaboration and coordination between different stakeholders’ technical teams eased implementation:

“All integration work happened inside MOMP by collaboration and coordination with the technical teams of government organisations.”

For this reason, MOMP was keen to maintain good relationships with all participating organisations by getting in touch and organising socialisation events that would get everybody known and help in fostering future collaborations. In this respect, the DGIT indicated:

“We have established a social media group using WhatsApp with all government organisations. So, everybody has got known. We also gather and meet physically every four months to socialise and exchange knowledge and update each other about the e-Government progress.”

- **Trust**

MOMP professionals believed that the high technological readiness at MOMP has been a key factor in gaining organisational stakeholders’ trust, which contributed to

implementation success and smooth running of e-Services. In this regard, the SSA confirmed that MOMP was trusted by its stakeholders:

“Other stakeholders have a high trust and complete confidence with MOMP because of the very high technological readiness we have.”

MOMP had also to create a trusting environment while dealing with IT vendors and other organisational stakeholders. The DGIT indicated that trust was insured through signing official agreements with the various parties the ministry had to deal with. For example, a non-disclosure agreement (NDA) was signed with the implementation vendor, and also data sharing agreements were signed with the government organisations that MOMP exchanges data with. She also noted that the supporting IT infrastructure provided by ITA did further bolster trust with different stakeholders. The DGIT stated:

“Regarding dealing with vendors, there is a non-disclosure agreement with any vendor to ensure that no aspects of data or information are leaked or disclosed outside the ministry. With respect to inter-organisational trust, we sign data sharing agreements with any participating organisation exchanging data with us, to protect data security and privacy on both sides. There’s ample inter-organisational trust supported by the infrastructure provided by ITA which protects data while controlling and monitoring data and transactional flow.”

Furthermore, with the growing awareness of the importance of technology and data security and quality, citizens became convinced that data protection systems like PKI and inter-organisational integration provide the highest data protection, and therefore, the trust had increased in using public information systems and e-Services.

- **Stakeholders Engagement**

Stakeholders’ engagement was also a crucial factor that helped to get clear business and user requirements. MOMP worked to practically engage business stakeholders and other beneficiaries from the beginning and throughout system development, through using different techniques such as prototyping. In this regard, the APM noted:

“The prototyping technique has been used to demonstrate system components and collect comments and feedback until we arrive at system acceptance, approval and deployment.”

In addition, MOMP had placed a great deal on users' participation and stakeholders' engagement. In this regard, the ministry dedicated one of the project team members to communicate with the stakeholders, internally and cross-organisationally. The SP when questioned about her key role in the project responded with:

“Communicate and coordinate with stakeholders, through general managers (or on their behalf) first, then with technical teams.”

The VPM, on the contrary, commented that stakeholders' engagement was a bit challenging, and this could have slowed down the progress of the project. He stated:

“Communication with stakeholders has also been a challenge, and engaging these organisations to this system. This may delay getting the solution completed right on time.”

Moreover, MOMP developed an e-Participation system to encourage citizens' participation and interact with its users for taking their suggestions and opinions on contemporary issues. In relation with this, the ministry activated the open data policy and made certain data accessible to anybody who can benefit from it. The DGIT claimed that the ministry had achieved its e-Transformation vision, so it is time to step forward to the e-Participation stage, as he reported:

“In 2018, we achieved our vision and we opened channels with our clients to assess their satisfaction with services, and the way to further improve them and deploy more online/self-services. We also ask them to identify issues with the current services, get their feedback and ideas for improvements, and from this, we derive solutions for some unsolved issues.”

Nevertheless, active participation from citizens had not so far happened for unknown reasons. The VPM, while discussing citizens' participation, indicated:

“Citizens do not yet actively participate.”

5.4.3.4. Attitude and Behaviour

- **Technology Acceptance**

The SSA reported that people's attitude toward the newly implemented solution was positive in general, and the environment had been very collaborative and encouraging both internally and externally. However, other informants witnessed different attitudes and behaviours. For example, the DGIT argued that resistance to change was one of

the challenges that delayed the project implementation, specifically integration and data sharing. He noted:

“Integration hasn’t been an easy task. We face challenges like resistance to change from individuals...”

Another example is that the AMMS and the vendor’s project managers, APM and VPM, believed that unwillingness to share or integrate was a key issue that hindered implementation. They linked this issue to the technological readiness of other organisations. In this particular situation, the APM stated:

“One of the key challenges is lack of readiness of some government organisations. There were important data needed from some organisations but they were not willing to share. The excuse is that they don’t have information systems or databases and they cannot provide these data electronically.”

The VPM also noted:

“There’s quite a big gap between design and reality that many organisations were not ready to integrate and a few of them never had an IT solution, and don’t have the desire to integrate.”

- **Perceived Costs and Benefits**

Almost all participants have perceived the costs and benefits of the AMMS implementation positively. They were able to realise the implications of the new change on both organisational and client levels. For example, the SP listed the organisational, social, and environmental benefits of the system. She briefly stated:

“Zero visits to the organisation, service availability, cost saving, reduction of traffic and saving environment.”

On the other hand, the HDCM believed that the system had reduced the organisational spending and the transaction fees paid by citizens due to the automated processes. He indicated:

“Regarding cost, it is reducing because of automation, and from the citizens’ perspective, the fees are less than before.”

Furthermore, the DGIT contended that the benefits sought from the creation of e-Government were achieved, noting the influence on the organisational environment and the implications on the public society:

“The decision makers’ role now has changed to the planning level. We are eager to achieve equality, transparency and people’s satisfaction.”

- **Perceived Risks**

Like any significant technological transfer, the AMMS implementation was accompanied by risk. In this study, multiple types of risks were perceived by the interviewees, for example, dealing with the legacy systems as indicated by the APM regarding one of the legacy aged systems that was becoming obsolete and lacking technical support. The APM described:

“The integration with ROP legacy systems is risky as there’s not enough support provided because ROP has little interest in the old systems, and they are phasing them out.”

In the same context, MOMP decision makers, like the DGIT, noted that the aspects of risk were very important, but the maturity level regarding dealing with risks had not been achieved in the e-Government implementation context. In this regard, the DGIT commented:

“Some people overestimate risks and lock themselves out from outside. Others want to improve regardless of risks.”

There was also a risk of losing the data when they were transported through physical mediums like flash drives, in particular those related to field surveys. However, there had been no strategies on risk assessment as reported by the DGIT.

Another type of risk was perceived by the citizens regarding the use of the online self-services published by MOMP. It was noted that the citizens’ use of the AMMS self-services, which were newly launched, was associated with a risk that was perceived in the caution of transactions failure or incompleteness of their application requests. As a result, a large number of citizens still prefer to apply to the respective services through private brokers (e.g., Sanad offices) as they normally did long before the launching of the self-services. In this respect, the HDCM reported:

“A large part of the citizens still relies on Sanad Services, and they are not very confident to apply to the services themselves.”

5.4.4. Analysis of the Effects of the Technological Factors on e-Government Implementation and its Success at MOMP

5.4.4.1. Technological Readiness

- **Technical Capacity**

Knowledge and availability of skilled human resources have been a pressing issue in the IT market in Oman. MOMP, like other government organisations initiating e-Government national projects, suffered from the scarcity of qualified professionals. To bridge the gaps in knowledge and skills, the ministry sought the assistance of the international firm Nortel. In this regard, the APM indicated:

“The implementation is being led by Nortel, the Estonian firm.”

Lack of sufficient knowledge and skills was identified amongst the challenges influencing implementation in AMMS at the project level, mainly outside MOMP, as the APM put it:

“... Mainly two challenges with the outside, lack of readiness and lack of technical personnel.”

This was also pretty clear from the comment provided by the DGIT:

“Integration hasn’t been an easy task. We face challenges like... a lack of knowledge about technology.”

Principally, MOMP provides a set of e-Services that require data to be shared from and to other organisations. In this respect, the APM reported a technical capacity issue, noting the unavailability, in some organisations, of technical personnel who possess the necessary skills to develop integration and data sharing interfaces using Webservices:

“There were important data needed from some organisations but they were not ready to share... there is no IT team to develop the Webservices, and/or APIs for sharing the data. We suffered a lot to get this data on time.”

The APM had further elaborated by bringing a practical example where integration did not happen due to the lack of system integrators, and data could not be shared:

“ROP has a new project called e-Visa which is going slowly and lacks the technical expertise needed for development. The e-Visa system should be the interfacing systems integrated with AMMS, but this integration couldn't happen because data has not been migrated from their legacy systems.”

Another issue was that the technical complexity of integration requirements had not been well understood, well-articulated and digested among all participating organisations, which caused misconception, as argued by the SP:

“We could handle most of the technical issues regarding integration. We face the challenge of miscommunication with other entities, sometimes regarding understanding the concept behind the requirements of the Webservices, and with system/data incompatibility other times.”

Meanwhile, the ministry had been striving to disseminate knowledge to system users and other stakeholders like citizens by conducting local training workshops and launching awareness campaigns through social media. In this sense, the APM noted:

“There's also user training and workshops before launching any service and correspondent back-office application.”

- **IT Infrastructure and Interoperability**

The development of e-Services relies on the technical collaboration and systems interconnections between the participating organisations involved in running the e-Services (Pardo et al., 2004). Such things must be supported by a strong and interoperable IT infrastructure across organisational boundaries. In this regard, MOMP developed a data sharing platform that was based on Webservice technology, which is the de facto standard used for data exchange and information systems integration. The SSA described:

“Most of MOMP integration is on the IS levels. They have Webservices for data sharing with other government organisations and all our integrated parties use the same technology which can be used by both sides.”

Although MOMP is said to be in high technological readiness, the analysis of the interviews revealed a lack of technological readiness in some participating organisations. It was found that the reason behind the lack of readiness was multifaceted. These reasons are related to several factors such as lack of supporting IT infrastructure, unavailability of information systems, absence of interoperable integration technology and frameworks. These are discussed below.

One of the key reasons behind the lack of readiness of some government organisations, as unfolded by MOMP participants, was the absence of computer-based information systems and databases. As a result, there were important data needed from some organisations, but they were not ready, and thus, unwilling to share their data. The APM stated:

“One of the key challenges is the lack of readiness of some government organisations. There were important data needed from some organisations but they were not ready (or willing) to share. The excuse is that they don’t have information systems or databases and they cannot provide this data electronically.”

The SP had also given an example of information system absence, the thing that made the integration with AMMS system either difficult or not possible at all:

“Some institutions are not ready and might have not got systems at all.”

Some participating organisations were also in a struggle to comply with the integration of standard technologies such as Webservices across government organisations that could be practically implemented and reused in all situations. While MOMP had adopted Webservices, following the standard integration method, using Webservices was not possible in some situations. The DGIT indicated the various integration methods used:

“We have integrated the core processes/systems by our staff (as a policy) using different ways of integration from different perspectives... The integration methods are DB links, Webservices, Web user/portal interfaces and Client-Server user interface. All our clients are linked through OGN. But we endeavour to convert all types of integrations to Webservice technology. However, some government organisations still cannot deal with Webservices.”

A similar situation was described by the SP, indicating the heterogeneity of some information systems and also lack of technology standards:

“We are integrated now with 27 organisations. Most of the systems are heterogeneous... Likewise, we are facing integration issues with MOHE for dealing with educational activities because MOHE has not yet been ready for sharing information through Webservices according to MOMP requirements.”

The SP also described how multiple, and ad hoc, integration methods resulted in the overuse of computing resources and developed systems interdependency:

“... our servers have limitations in dealing with multiple integration points, storage- and performance-wise. For example, the integration with PAMR is ad hoc, through DB link, but not according to agreed standards. PAMR is making changes to their systems, and this is affecting the integration.”

The VPM pointed out that the absence of an integration framework was a central issue, in addition to lack of integration software and the coexistence of point-to-point integration:

“There is no framework that can be used for integration. Software for integration does not exist, and point-to-point integration with other organisations.”

5.4.4.2. Data Management

- **Data Quality and Standards**

The aspect of data consolidation had been a key requirement in MOMP. However, data received from various organisations had been redundant, discrepant and possibly not original. Other organisations had no mechanism for data consolidation, as their data were scattered in different locations. MOMP interviewees reported that one of the reasons for this issue was due to the multiple point-to-point integrations which have already been described above. For example, the DGIT described one of the data quality problems:

“We faced two key issues with CBO; they were related to civil number availability and correctness, and the commercial number.”

In the same vein, the VPM pointed out the data scattering problem and suggested that organisations should consolidate their data in a central data source before being shared. He commented:

“It would be very interesting if they have centralised data, from their different branches, to share with others.”

As a consequence, different problems had proliferated. For example, a Systems Integrator (SI) in MOMP reported several data anomalies and, likewise, called for a central integration (i.e., ESB):

“One of the challenges is duplication of data in multiple systems of various organisations due to point-to-point inter-organisational integration. So, this creates data discrepancy. Central integration where all shared data are centralised in one place can eliminate such problems.”

Nevertheless, MOMP professionals had been striving to improve data quality by extending the integration network possibly to every data provider, whether public or private organisations. For instance, the DGIT indicated that data integration with ROP, PAMR and CBO helped to consolidate the data and strengthen the data validation process. She stated:

“We extended our integration with government organisations. For example, we get personal and occupational data of expatriate labours once from the source (ROP and PAMR), so we do not re-enter them into our systems... We have also established integration with the Central Bank of Oman (CBO) to check salary transfers for private sector employees and validate it against their contracts.”

Nonetheless, the ESB integration platform was introduced by ITA to centralise shared data with secured connectivity. Few key stakeholder organisations had yet joined the ESB to exchange the commonly shared data. The SP advocated this integration platform and suggested that ITA shall push other organisations forward to join the ESB integration hub:

“Now we are integrated through ITA-ESB for security issues. For example, integration with PASI, MOCI and PAMR, which are key stakeholders of the project, is through ESB for security and standardisation reasons. Some organisations are not fully aware of these requirements and do not fully

recognise that this is the government method of integration and that all must follow. ITA shall work hard to convince other organisations to follow this method.”

- **Data Security and Privacy**

As the data suggests, MOMP is an ISO certified organisation in IT security. Therefore, data security and privacy standard had been crucial aspects of the AMMS project. The ministry had been very keen to ensure that every data exchange and transaction inside or outside MOMP was handled with great confidentiality. In MOMP, there is a department concerned with cyber security that oversees networks and information systems security across the ministry. The SSA overviewed the security and privacy procedures that had been followed by the ministry:

“Data and security standards have been strictly followed in this project as we are an ISO certified organisation in IT security. All the data that have been shared between this ministry and other ministries are transferred securely through OGN. Data security awareness is circulated regularly to staff and contacts of the ministry. Personal security is very high and there’s auto-screen protection enforcement in personal computers of the staff. Password change is enforced regularly.”

Moreover, the ministry had already joined the ESB integration hub, as aforementioned by the SP. The ESB is supported with data encryptions and anonymisation protocols as confirmed by ITA professionals. In addition to this, the ministry had been committed to following the security and confidentiality standards imposed by the ITA platforms for data sharing and secured transactions, which included an e-Payment portal and PKI infrastructure for user identity and confidentiality. The knowledge and benefits of using PKI were articulated to the different levels of the AMMS users to facilitate its use and understand its technical requirements. The DGIT described:

“We integrated with the e-Payment portal for electronic payment transactions, and PKI to identify online users’ identity. PKI was a challenge at that time because of the devices it involved. We started an awareness campaign to teach our users and agents about the use of PKI. So, we established PKIs for every user and agent (e.g., Sanad offices). We adhere to all national initiatives and so we don’t reinvent the wheel.”

The DGIT also confirmed that security threats such as unauthorised access are controlled and monitored by ITA. She also noted that MOMP maintained an ongoing assessment on the network-connectivity level with each organisation. Furthermore, every organisation has its own security rules and protocols applied when receiving data from outside.

5.5. Case Study Analysis: MOCI

This section presents the findings of the study conducted at MOCI. The process of investigating the effects of socio-technical factors on e-Government implementation and its success at MOCI was carried out using the outcome of two methods of data collection, semi-structured interviews, and document analysis. The interviews were conducted with 11 MOCI participants from three organisational levels including top management, project managers, operational staff and technical specialists, as shown in Table 5.3 below.

MOCI Case Study	
Management Level	Number of Interviewees
Top Management	2
Technical Specialist	1
Media Specialist	1
Marketing Researcher	1
Front Desk Service Operator	1
Vendor	1
e-Service Executive Consultant (ITA)	1
External Governmental Stakeholder	1
Business Investor	2
Total	11

Table 5.3: Types and Number of Interviewees at MOCI

All interviews were tape-recorded. The interviewing process started with the focal point of this case organisation, whose position was Director of IT Department (DIT). Then the snowballing technique was followed to identify the rest of the participants. All interviews were transcribed, translated into the English language (for those conducted in Arabic) and reviewed by the researcher before analysis. The supporting documents were collected during and after the interviewing stage. They were used to support the findings of the interviews and to collect background and contextual information about the case organisation.

5.5.1. MOCI Background

MOCI is a government organisation in Oman which was established pursuant to the Royal Decree number 40/1974 (MOCI, 2019b). MOCI is mainly responsible for the issues related to two key economic sectors in Oman, which are the commerce and the industry sectors. The core responsibilities of MOCI are to regulate the processes of business registration, business licensing and annual reporting. Business registration is about the commercial registration of companies and the update of their information. Licensing of business is related to the permission to practise business activities after obtaining approval from the government to start the business. Annual Reporting is related to submitting the official annual reports to the government, and publishing data about the commercial activities to ensure transparency and protection of rights (MOCI, 2019b).

The ministry is also responsible for implementing the law of commercial development, imports and exports, intellectual property, and protection of copyrights. Additionally, MOCI is responsible for defining and maintaining industry standards of specifications and metrology. MOCI headquarters is located in Muscat, the capital of Oman. It has 11 regional branches across the Sultanate. It currently has around 1000 staff and provides about 50 to 55 public services.

Moreover, MOCI had established the Sultanate's office at the World Trade Organisation (WTO) for negotiations with the WTO on various issues (MOCI, 2019b).

5.5.1.1. e-Government Implementation and Readiness Status at MOCI

MOCI obtains and shares part of the data through the ITA data hub (ESB), while some data are provided through point-to-point integration as these kinds of data were not shared among all participating organisations, such as investor data that are obtained directly from ROP. MOCI had exploited a range of national IT infrastructure resources provided through ITA, including a user authentication mechanism and digital signature (PKI), the e-Payment gateway to connect with Bank Muscat and the Central Bank of Oman (CBO), and with NCSI to report business activities. At present, MOCI is linked electronically to all relevant systems of the organisations participating in commercial registration and licensing. For example, it is integrated with ROP to read personal information and to identify black-listed marked investors, with MOMP to read labour information, and with OCCI to validate business membership certificates.

Moreover, it was connected with the World Intellectual Property Organisation (WIPO) to obtain information related to trademarks to check the registered trademarks globally. There are data sharing agreements signed with every integrated party where all network connections go through OGN. The e-Government development at MOCI had undergone various stages, as described in Table 5.4.

Timeframe	Achievement
2001	The thoughts of assimilation between MOCI and other government organisations took place, as an initiative of a ‘physical’ one-stop-shop service, for simplifying and expediting business activities.
2003	The national initiative of electronically integrating the public organisations' information systems into a single gateway/portal came across.
2004	A tender was issued to study and analyse the requirements.
2006	All regional databases at MOCI were merged into a single (centralised) database in the head office.
2007-2009	<ul style="list-style-type: none"> - MOCI became the first government organisation connecting and communicating through OGN. - All regional sites were connected through OGN. - New local systems started to emerge. For example, a new system, called e-Office, was implemented for electronic archiving and correspondence. - MOCI had been linked with the government financial system in the Ministry of Finance (MOF) and the human resource system in the Ministry of Civil Service (MOCS).
2010 - To Date	<ul style="list-style-type: none"> - Access to the MOCI systems was provided through the brokers' offices (e.g., Sanad offices) on behalf of the investors. - Webservice had been adopted, as a de facto standard, for integration and data sharing with government organisations. This method of integration started with NBO, MOMP, OCCI and MM. - MOCI implemented and launched the InvestEasy national e-Government project.

Table 5.4: e-Government Development at MOCI

To date, the e-Government services provided by the MOCI InvestEasy system covers 80% of the ministry's core work (the InvestEasy project is described in the next subsection). The other 20% are internal processes related to other matters apart from

doing business. Thus, the InvestEasy package of services covers the public services provided for commerce and industry sectors. In the next few months, intellectual properties and trademarks will also be covered and provided online. In the short term, all services will be automated and provided online as self-services, except those related to specification and standardisation, whereas services that require physical presence are provided internally in the ministry, for example, ownership transfer and mortgage registration. The ministry still receives contacts for a few other cases, such as a foreign investor who is not yet a resident in Oman, who cannot register online because his/her data are still not available. And so, in such cases, the investor has to be registered manually in the ministry using passport information. For these reasons, the front office has still been operational.

5.5.1.2. The InvestEasy Project

InvestEasy is one of the national initiatives which had been planned as part of the national e-Oman strategy. The idea of the InvestEasy initiative is to have a central system used by the whole government. It is about a comprehensive suite of e-Services designed to provide the business community with a single window to interact with the government, starting from establishing a new business, licensing the activities as well as submitting annual reports (MOCI, 2019b). The project aims to unify, simplify and speed up the process of business investment in Oman by providing citizens, entrepreneurs, prospective investors and businesses with the services and information they need in a timely and efficient manner (MOCI, 2019a). In other words, it is a paperless, automated approval, based on a set of prerequisite conditions. If these conditions are met, the investor can start his/her company automatically without any human intervention. This aim, in practice, is exemplified through the objective of reducing the time used to establish business from 30 days to a maximum of one day.

InvestEasy is the largest e-Transformation project in Oman focusing on simplification of business. It is an e-Government initiative led and derived by MOCI with the partnership of other entities that are part of the business environment. Apart from MOCI, the project

has seven primary public organisation partners and 30+ other stakeholders. The partners are the main entities who have a direct effect on the business environment and have primary roles in the processes of the business in Oman, e.g., OCCI, MM,

ROP, ITA, MOMP, MOECA, MORM. The stakeholders are any public or private entity, or a person who is part of the business environment and is interested in doing business. The idea of the project had emerged following the physical one-stop-shop business described earlier, which was considered the first stage of the project.

By the end of 2012, MOCI launched its first fully electronic service, the reservation of a commercial name. In 2013, another e-Service was launched, which was the renewal of a commercial certificate. Later in the same year, MOCI officials just thought of how they could, centrally, provide a suite of e-Services. That was in response to the outcome of the national committee, Tanfeethe, that recommended the automation of all processes related to commercial investment. After that, a team for e-Transformation was formed in the ministry to accomplish the task and seek external advice for a vision towards achieving international standards for simplification of business investment in the country. Thus, the InvestEasy initiative was proposed and forwarded to the Cabinet for official approval. In this respect, the Oman government decided to mimic Estonia, which had been considered as one of the best countries for establishing a business.

Following this, the e-Transformation team consulted the Estonian government regarding converting the one-stop-shop from physical to virtual. The team visited Estonia to learn from the Estonian experience and witness it on the ground. So that the technology in place could facilitate the electronic transformation while the support from ITA and the Cabinet was committed, the e-Transformation team decided to launch the InvestEasy project with the cooperation of the Estonian firm Nortel to execute the project.

The project contract was signed by the end of 2013 for six key stages over three years. Every stage was to include a suite of e-Service deliverables, provided that all services were to be integrated with the respective organisations and be accessible through different ICT channels, primarily the Internet and smart mobile devices. The full business process was re-engineered to get rid of paper transactions and integrate with other government systems such as MOMP to enquire about labour force data, ROP to retrieve the personal data of the investor, the digital signature system (PKI) and the e-Payment gateway for secure access and transactions. The project's success depended heavily upon the effectiveness of integration among the respective organisations and

the trust between all parties including the investors, who were required to present the necessary documents electronically and bear the responsibility for their correctness and originality.

The governance structure of the InvestEasy project comprised a steering committee (Project Board) and an executive team. The steering committee was formed and led by the Minister of MOCI and chaired by his undersecretary. It included members of the general manager and CEO levels, from the seven key government organisation partners. The executive team was led by a project manager, who was a staff member at MOCI, and included 17 members from the key stakeholder organisations. Under the executive team, there were 13 other sub-teams working in different aspects. The sub-teams include 46 team members from different government entities. Private sector organisations had also been involved throughout the project, including Sanad offices, free zones, lawyer offices, and everybody else touching the business environment. The project was sponsored by the Cabinet as a mandate.

The original business processes (as-is) was re-engineered, resulting in 29 to-be processes. However, only the key services, which are Business Registration, Licensing of Business Activities and Annual Reports, had initially been implemented in the InvestEasy system. Since then, the transactions and flow of these services have been taking place in the InvestEasy system, which interacts and exchanges data with other systems in other government organisations. Certain business activities that do not require permission are automatically approved by the system. But certain conditions, for instance, the environment or health, or regarding importing cattle, or planning fisheries, have to be manually verified by human supervisors. Such approvals are in place and the types of these approvals are automatically identified by the system, then sent to various experts who can validate the documents and interact with the customers directly. For example, if there is an activity owned by MOECA, it goes through the InvestEasy Portal, which interacts with businesspeople (investors). So, investors submit the licensing application through the system. Respective organisations (MOECA in this case) have the choice to process the licensing request internally and inform the InvestEasy system or use InvestEasy directly to perform the job in case their own systems are down or not ready. If the processing time allowed has been exceeded, the system would automatically approve the request. In such a case,

MOECA bears full responsibility, while the InvestEasy system notifies MOECA in any case to follow up and evaluate the risk of any environmental damage. The aim is to attract and retain investors.

The InvestEasy system has two main user interfaces, the self-service (online) interface which is used through the portal (www.business.gov.om), and the back-office interface which is used by MOCI staff and other remote service centres (i.e., Sanad and lawyer offices). Service centres are given some authorisations with certain roles, and they are registered in the system as staff. The back-office system has an administration level so that forms can be created, and roles can be defined and accessed based on the level of authorisation given.

The implementation of the InvestEasy project resulted in various economic, social and technical benefits. New KPIs were defined as success factors for the implementation. A lot of unnecessary activities (i.e., waste) were eliminated. Consequently, Oman's international ranking in business development had dramatically improved. The World Bank indicator, which marks the assessments of changes and developments in the business environment, and the impact on the beneficiaries and national economy, ranked the indicators of 'starting a business' in Oman at 32 in 2017 and 31 in 2018 in the world, and number 1 among Arab countries. Compared to 159 in 2016, Oman's ranking had increased 127 points in 2017 and one extra point in 2018 in the indicator of 'starting a business' in the world (MOCI, 2019b). On the other hand, in the indicator of 'ease of doing a business', Oman is ranked 71 globally in 2018 (MOCI, 2019b). These indicators had been targeted since the beginning of the project.

Moreover, the project had contributed to improving people's IT literacy as people became a bit more IT savvy. The project also indirectly improved other organisational entities. For example, InvestEasy was the first project which implemented PKI and smart card authentication, and as a result, PKI became widely used by people and other organisations in Oman. MOCI officials feel proud that the InvestEasy project was the technology driver in the country which has changed how people do things that no other Arab and GCC country had ever achieved so far. Officials claim that Oman was three years ahead of all the GCC countries. The project has changed the way the country functions.

Given the above background about MOCI and its InvestEasy e-Government implementation projects, the next three subsections (5.5.2 – 5.5.4) investigate the effects of socio-technical factors on the implementation of the InvestEasy e-Government project. These factors have been subdivided into three key dimensions, which are environmental, organisational, and technological.

5.5.2. Analysis of the Effects of the Environmental Factors on e-Government Implementation and its Success at MOCI

5.5.2.1. Pressure Forces

- **Institutional Isomorphism**

The findings of the interviews with MOCI participants indicated that institutional isomorphism was a key environmental factor that influenced the implementation of the InvestEasy project. Those institutional forces were exemplified in coercive, normative, and memetic pressures as explained below.

Coercive and normative pressures were present prior to and during the implementation of the project. Mandates from the Cabinet represented strong motivations toward transformation to e-Government and project initiation. There had also been direct pressure exerted by the Minister of MOCI to accomplish the project and meet the deadline. These situations have been described by the Marketing Researcher (MR) of the project:

“External and internal pressures were from the Cabinet and the Minister of MOCI who mandated the project to finish in two years, while in Estonia it took five years.”

Another strong coercive pressure came from the business investors who are the primary stakeholders of the project. The investors were dissatisfied with the old complex process and the long and tedious procedures of starting a business in Oman. The Director of the IT Department (DIT) in MOCI explained such issues by saying:

“... the key external pressure was the complex process of starting a business in Oman, and there was influential dissatisfaction from the investors.”

This pressure in particular had internally driven MOCI decision makers to rethink the process towards improving and speeding up business registration and licensing

services. As a result, a normative response to the investors' needs was observed, as indicated by the Service Executive Consultant (ESE) from ITA, who was part of the project team:

“The idea of the project had emerged following the physical one-stop-shop business.”

Furthermore, there was pressure to start the InvestEasy project, generated by the desire to replicate the Estonian's experience of the development of a business portal after a visit that MOCI had arranged to Estonia to learn from its experience of starting a business. In this regard the MR noted:

“A team from MOCI was formed and visited Estonia to learn from the Estonian experience.”

- **Media and the Public**

During the project, MOCI had managed to organise a couple of media campaigns for public awareness, informing of the progress and stressing the importance of the transformation. Such campaigns had put a lot of pressure on project management and work teams to meet the deadlines and accomplish the designated goals. The InvestEasy project manager (IPM) described how the media had influenced the project:

“It includes putting pressure indirectly on the partners and stakeholders. Communication activities were taking place during the journey of the project, including social media and traditional media. TV and radio programmes were held for discussing the project, the goals achieved, the e-transformation benefits, the impact on business environment and investments size, the ICT readiness, and so on.”

The IPM also noted that different media channels highlighted the importance of the project and the anticipated impact on the business society and the national economy:

“Newspapers were writing about the project in separate periods showing the impact of the e-transformation on the business environment. News and change management campaigns were done through social media.”

The different media channels and the official decisions being made by the Cabinet supporting the project contributed to putting pressure on MOCI decision makers as the

beneficiaries were very keen to understand the outcome and the anticipated benefits and implications of the project on their business.

In this sense, a media specialist (MS) from MOCI indicated that media and the public played a role in shaping the project and adapting to the new culture of doing business either inside MOCI or among the investors. During the implementation and deployment of new e-Services, there had been diverse responses from the investors, as the MS described:

“We often get feedback from the media and the public whenever we launch a new e-Service to the investors. However, we used to consider every single criticism to convert it into an opportunity to improve the service. This factor, in particular, has positively influenced the project and helped in enhancing its deliverables.”

- **Economic Conditions**

From the perspective of economic and financial status, there was no major issue despite the global financial crisis, which affected most of the other projects funded by the government. The InvestEasy project had continued to receive the needed financial support from the Cabinet and had its own budget. The substantial saving (i.e., return on investment) the project had been making and the drastic improvement in the World Bank indicators for doing a business encouraged the government to invest in the project. In this regard, informants argued that there were no major financial issues that obstructed project funding. For example, the DIT confirmed:

“Financially, there was no issue ...”

The MR commented:

“Financial capability did not harm the marketing as we used government money at the beginning but then we used free and existing resources like social media and email.”

Similarly, the IPM noted:

“Financially we are not struggling because the budget has been already allocated.”

5.5.2.2. Policies and Legislations

- **Institutional Legitimacy**

The findings of the interviews revealed that there had been no set of laws that give direct legitimacy to MOCI to actively engage in collaborations and data sharing with other organisations. Nevertheless, informal mandates were considered as legitimate to acquire and share data and resources. For example, the IPM indicated that the e-Oman Strategy, Cabinet decision and steering committee decisions enacted as mandates of the project as a national project, like inter-organisational data and process integration. The IPM mentioned:

“e-Oman Strategy, Cabinet decision – contains the principles of the project as a national project like integration of systems (process and data), project vision – approved by the Cabinet and shared with steering committee – includes the main themes of the project, like transparency and integration of data and process, and support of steering committee.”

The ESE, likewise, conveyed the same by highlighting the role of the Cabinet in providing legitimacy to the project, by stating:

“InvestEasy receives managerial and financial support from the Cabinet itself.”

- **Regulatory Frameworks**

The InvestEasy project is the central business hub for establishing a business in Oman. It attracts investors and various organisational stakeholders, some of whom are involved in the data sharing, and the others are users or beneficiaries of the system services. Therefore, for effective implementation, legislative frameworks for data sharing and access policies are critical. However, the findings of this study with MOCI participants revealed that they had merely been one-to-one data sharing agreements among the participating organisations, while, at the national level, there was a lack of a standard regulatory framework that govern data and information sharing. For example, while discussing with the IPM the issue of the existence of a standard regulatory framework defined at the national level, he responded:

“Not yet. There is just a one-to-one data sharing agreement depending on the type of sharing and type of needed data. There are data sharing agreements signed with every integrated party.”

On the other hand, the ITA agent (i.e., the ESE) indicated that there had been a set of rules that could help in regulating inter-organisational data sharing and access policies, although this was not being used by the public organisations. She stated:

“Some legal rules are there but not activated.”

Regarding the technical side, MOCI follows the GISF defined by ITA. In this regard, the IPM added:

“Currently the standard is using Webservice technology and there is a procedure for achieving the integration. We follow the ITA framework.”

5.5.3. Analysis of the Effects of the Organisational Factors on e-Government Implementation and its Success at MOCI

5.5.3.1. Managerial Capability

- **Leadership and Support**

The findings revealed that the InvestEasy project had received managerial and financial support from the highest authority in the Oman Government, which is the Cabinet itself. The decisions taken by the Cabinet made the project move consistently. This suggests that the project had been powered and supported by a high-level leadership authority. The Service Executive Consultant (ESE) from ITA, who was part of the project team, acknowledged this strong support, and as a result, there was a high positive influence on the implementation progress of the project. The ESE said:

“Top management always supports implementation. We observed that transformation projects in advanced countries were led by the highest authorities in their countries. So here, in Oman, whenever there is support from top management there’s really a very high influence.”

The ESE further stated:

“The decisions taken by the Cabinet made the project move along.”

The IPM agreed with the ESE as he emphasised the sponsorship and leadership role of the Cabinet by asserting:

“The project is sponsored by the Cabinet as a mandate.”

Apart from the Cabinet, the project had also been directly supervised and supported by the Minister of MOCI and his undersecretary, as the DIT stated:

“The top management has been fully supporting the project.”

InvestEasy had also been given support from ITA, as an ICT statutory authority, by providing the required consultancy and the needed expertise during the planning and through business analysis and implementations. The ESE highlighted the supportive role of ITA in the project by describing her involvement:

“InvestEasy is one of the core strategic projects that we are supervising and providing support. I used to work as a business analyst in the MOCI one-stop shop during its early stages. I was leading the business side. My [current] role is more in business and process analysis, taking care of the transformation effort from its beginning. We also support and review the transformation plan and documentation along with the business process development (to-be process).”

On the other hand, part of the project was change management. This was regarding fitting the new management and system process within the business context, inside the organisation and amongst the stakeholders of the project. Despite the highest project management standard followed and the strong support given by the Cabinet and MOCI senior management, change management was one of the chronic issues in the InvestEasy project. The adaptation to the new practice had been very slow, however, from the key decision makers. There had been awareness campaigns prior to launching any new service and the expected changes in the way the service was offered in different media channels such as social media, TV and newspapers as well as through practical workshops. But again, the change was not happening in time and had negatively impacted the implementation of the InvestEasy system. The IPM argued that change management was not given enough attention for such a radical change. He reported:

“Change management was very weak in the project... In social media, we are working with the users. But what about the change management, regarding levels of top management who are the decision makers? This is very difficult and not happening as planned. It is a huge project with very few resources.”

The IPM referred to the slow change to the low pressure from the top management on project stakeholders. He further exemplified the case of Korea as a good change management model by saying:

“But the change management, again, is the weakest link, and there’s low pressure from top management. For example, in Korea, the change was imposed from the highest level. Without this, change wouldn’t have happened.”

- **Strategic Planning**

Diversification of economic resources is part of the strategic vision of the state, Oman2040. InvestEasy had arisen as a national initiative of the investment in ICT through e-Government development to achieve this strategy. Thus, the project was started with a very clear vision, as indicated by the IPM:

“We started InvestEasy project having a clear vision of what we wanted to achieve, and our requirements were very clear.”

Simplifications and acceleration of the procedures of starting a business in Oman was the goal that MOCI wanted to achieve. This strategic goal had been clearly stated and articulated in the ministry and around the business environment. The ministry also targeted to reduce, or even eliminate, the number of physical contacts in the head office, and so advised the investors to use the online e-Government Portal to avail themselves of the service and track their applications. The IPM further noted:

“Our vision, next, is to make it a one-day process or even less (i.e., zero days). ... Furthermore, our goal is that all services are self-services and zero contacts.”

The DIT also described the two KPIs the ministry wanted to achieve through the InvestEasy project, noting that a licence for starting a business activity in Oman must be processed within a calendar month:

“The project has to achieve two main KPIs; the first is that registration of a business must be done in one day, the second is that getting a licence for starting a business must not take more than 30 days.”

Likewise, the project manager from the vendor company (VPM) during the interview indicated the same, asserting that they seek to further reduce the processing time for starting a business to three minutes:

“The three-year aim of the project was that doing business in Oman is simplified so the processing time used to establish a business, which used to take at least 30 days, is minimised to three minutes.”

5.5.3.2. Structure and Culture

- **Organisational Structure**

The effect of the organisational structure in the InvestEasy implementation was two-way. Initially, the structure had affected system implementation in the sense that the change sought through the implementation was relatively slow because the traditional organisational structure was not supportive, and hence, delayed the change. In this regard, the IPM described:

“The change here takes a lot of time going through the hierarchical structure...”

The MR also indicated that the traditional organisational structure at MOCI was a barrier towards implementation, which caused resistance to change from some key staff at the beginning of the project. She reported:

“Structure influenced resistance to change, but the support of the minister weakened it.”

On the other hand, there was an inside-out effect in which the new process flow imposed by the system had implications on the organisational (bureaucratic) structure inside and also outside MOCI. In this sense the traditional organisational structure had been overridden by the system as reported by the IPM:

“Internally, the hierarchy was changed to adopt the new workflow of tasks designed by the system. Externally, the same happened in some entities.”

Additionally, it was noted that the new bureaucratic structure, forced by the new system design, could not be ignored, although there was a misuse of the procedures by some users, as indicated by the IPM. In response, the system process flow forced some organisations to re-engineer their organisation processes related to business

licensing to cope with the requirements of the holistic process. In this sense, the IPM indicated:

“Some entities [external organisations] are using InvestEasy as the main system as it provides full features for all the process, so they achieved the project goal by not duplicating systems in the government, while some of them still want to stick with their systems, although InvestEasy is supporting and providing their needs, so they are duplicating systems and overcharging the government.”

- **Organisational Culture**

Factors related to the organisational culture represented tedious challenges, as indicated by MOCI participants. One of the challenges was the investors' mindset shift from the traditional way to the new electronic way implied by the technical solution. The VPM pointed out that such a shift had been taking time. He described these cultural issues, most of which emerged at the beginning of the project:

“We had tremendous challenges. Obviously, the biggest challenge is people. People were not ready to accept the fact that an electronic document is the de facto standard or legally binding. It was not accepted by the culture. The culture, when we came to this country four years ago, was that people were used to feeling paper, tangible things. They wanted to see stamps and signatures on papers.”

This was observed by the researcher during the data collection process, through the behaviour of some business investors who insisted on contacting MOCI in person. To investigate this particular situation, a front desk operator in the ministry was interviewed as he responded:

“Some investors still contact the ministry in person as their mindset yet has not comprehended the electronic [new] way of doing business registration.”

Further, the researcher also questioned two business investors regarding their reasons for being in the ministry. The first investor replied:

“In this week I have come five times, all the week I have been here. We did the application with Mr. [...] over here... we have to go to different departments.”

The second one similarly stated:

“I had to go to the Sanad office to get the smart [paper] forms, and then I came here to finish the registration of my company here.”

These were things for which investors no longer had to bring papers to be signed and stamped. Investors were saying ‘*How is that even possible!*’ as noted by the VPM. These are the cultural shifts MOCI faced, but the good news was that MOCI professionals had been striving to resolve them.

Part of the cultural issues was related to the staff mindset. The persistence of such issues could be linked to the ineffective change management programme (as already described previously). The VPM continued his talk and indicated how difficult it was to change people’s mindsets, and the staff’s in particular. He mentioned:

“It was tough to change the people and their mindsets. It took us about two years to penetrate the minds of people, especially the staff. Staff were not ready to accept the change and tended to keep the traditional paper-based way of working.”

- **Organisational Politics**

Organisational politics had been a major issue associated with the implementation of the InvestEasy system. The system was designed to be process-centric, which can optimise the entire cross-organisational business process. It is a single information system, but it turned out with other organisations wanted to keep their systems running to protect their image. However, this was costly to maintain and created interdependencies between the information systems across organisations. In this regard, the IPM expressed his concern as he noted:

“We are trying to change this, but we find it very hard to convince other organisations. There also exist organisations that don’t adhere to the mandates posed by the Cabinet and the Supreme Planning Council.”

The IPM further explained that the project team fell in a struggle to apply the new structure of the decision flow implied by the new practice as decision makers, inside MOCI or across the participating organisations, wanted to keep their influence on the decisions as they used to be. He stated:

“We suggested a new structure, but it wasn’t followed because organisations want to keep their responsibilities inside, as part of their job, and are afraid of shifting power. Decision makers want to keep their influence on decisions.”

The DIT shared the same view and brought up another example of political issues that arose due to the introduction of InvestEasy and its implications on the power of authority. As a result, organisations, particularly those who have power authority on the decision process, hesitated to share the data despite the mandate from the Cabinet. The DIT indicated:

“The most important barrier is that stakeholder organisations have low acceptance of the project and hesitate to share data and give authority. This is because of some decision makers’ perception of the shift of power and lack of authority, despite the clear commands from the Cabinet.”

Similarly, the MR described another situation of the same issue, where an organisation tended to reject the system and was reluctant to integrate its service with the InvestEasy system as it wanted to retain its service on its own premises and avoid scrutiny. The result of such a rejection was a delay in the project deadline and a wider spread-up of resistance. She stated:

“One of the challenges is that there were government organisations which planned to establish their own portal to provide their services online, and so they wanted to provide services related to business activities through their Portals. One of these organisations is OCCI, which was reluctant to integrate the service of getting membership certificates through InvestEasy. This caused a delay to the project deadline and spread this type of resistance to other organisations. The second reason why they reject it is because they do not want transparency in their work, because negative things will be clearly seen.”

An external organisational stakeholder who had been an OCCI clerk was interviewed to understand whether they still offer the same service in their portal, which duplicates the process in InvestEasy. The clerk stated:

“Our portal is still available to the investors, and they do register and can also renew their business licence or alter business activities through it.”

The MR also noted the change in job roles and personal conflict of interest of some staff with the investors that had existed previously and were going to be faded out by the system. Such changes made those staff publicise negative propaganda about the system. The MR indicated:

“Some of the staff also articulated negative impressions about InvestEasy to investors. Others were concerned about shifting their job or roles and losing self-interest with investors.”

The IPM meanwhile, pointed out a political issue on the vendor’s side, where the vendor tended to save the cost of the implementation while making a large profit by playing with the requirements. The IPM noted:

“There was a big challenge in dealing with the vendor. Usually, vendors, and especially those in Europe, think that we do not have any idea about technology. So, they want to manipulate the project and provide minimum resources while getting maximum profits.”

- **Business Processes**

MOCI officials argued that the technical side, during the implementation of the InvestEasy system, was not an issue, but the issue was in the process itself, and the obstacle of aligning it with other government entities. InvestEasy had to be integrated with 28 government organisations. The complex structure of the business processes, which spans multiple organisations, was an issue during the implementation of the InvestEasy system. The ESE confirmed that the business process was a key challenge in the project:

“The technical side in InvestEasy was not an issue, but the issue was in the process itself, and the obstacle of aligning it with other government entities. It had to be integrated with 28 government organisations.”

MOCI interviewees argued about the fact that business processes across the participating organisations had been re-engineered before system development (i.e., in the business analysis phase) by a world-leading expert. For example, the DIT stated:

“The business processes were re-engineered and all the steps for the study were documented. The study was performed by an external consultant firm from

Estonia, which is considered one of the best countries in establishing businesses.”

However, conflicts of tasks among the organisation had persisted. In particular, the process of licensing the business activity can have different activity owners depending on the type of activity sought. While business activity approval is supposed to be a central process regulated by MOCI (i.e., through InvestEasy), the key issue is that municipalities wanted also to impose their own regulations even though they were not the activity owner. They used their own terminology for their approval, calling it a ‘Municipal Licence’. However, in such a particular case, municipalities should only seek municipal approval for the location of practising the activity but not the activity itself. Such practice made the process redundant with conflicting regulations. The IPM explained this dilemma in the process structure by stating:

“Municipalities are using the wrong terminology for their approval, and they are calling it a ‘municipal licence’. They interfere in licensing the activity even if they are not activity owners, whereas their role is to license the place of practising the activity but not the activity itself. So, if we take the example of an activity owned by MOECA, the investor has to get one licence from MOECA and one municipal licence; and both licences may have conflicting terms and conditions.”

The other issue related to the business process was the lack of standardisation across municipalities. The IPM noted this by saying:

“On the other hand, the processes and tasks of the different municipalities, e.g., MM, Dhofar M, Sohar M and regional municipalities, where every municipality has a unique process and unique set of regulations, are not standardised across all.”

- **Governance and Operations**

The project was managed with the best practice and the highest project management standards. In this sense, MOCI followed standard project governance and structure by forming a project hierarchy that constituted a steering committee, an executive team and project managers. The DIT described this governance structure:

“The project has a steering committee, formed by the Minister of MOCI, chaired by the Undersecretary of MOCI. It includes members of general managers from eight government organisations. The management structure of the project comprises a project manager, etc.”

The IPM described the project governance further, highlighting different levels and sub-teams existing in the participating organisations, by stating:

“In project governance, we have a structure with 13 sub-projects, with several teams working in different aspects. We have 46 team members from different government entities.”

Regular project review meetings had been held with the stakeholders, and between project committees and teams. Furthermore, a monthly newsletter for reporting the progress and current stages of the projects was issued to follow up the project progress. The criteria of simplification, the standardisations to be used across participating organisations and the best practice imposed, helped, and pushed the InvestEasy project forward. This operational regime was noted by the IPM:

“We are having regular project meeting reviews with the stakeholders, and weekly meetings with the MOCI undersecretary and CEO of ITA. We are having monthly steering committee meetings, and a monthly newsletter to report the progress and current stages of the projects. The newsletter is distributed to all stakeholders via emails and in the portal. So, everybody knows what is happening in InvestEasy. We have a meeting tracker.”

The implementation process followed standard project management practice by adopting the project management professional (PMP) methodology that implies multiple development stages along with a communication system, phased deliverables, periodic reporting, etc. The VPM highlighted the project stages, contending that the project had been on the right track and that all deliverables were produced on time, by saying:

“We started the project four years ago. It went into multiple phases: analysis, software development, change management, implementation, and support. So we completed all the tracks, right now the system is up and running, and it is currently used by at least 30,000 active users in a month, which is a huge

number, with an average of one million visiting the country in a month. So, the project is on track, completed and delivered.”

With respect to the financial management, MOCI worked towards overcoming the limitation of the budget by looking at different funding and operational alternatives to keep the project flow on track. In this regard, the ESE pointed out the negative influence of the funding shortage, while seeking different funding solutions:

“Financial capability has a negative influence currently, and the process of funding is slow, but there are other solutions.”

In the same vein, the MR gave an example of introducing new alternatives for the marketing and awareness campaigns, such as the use of the free available resources:

“Financial capability did not harm the marketing. We used government money at the beginning but then we used free and existing resources like social media and email.”

- **Motivations and Incentives**

Although the InvestEasy project cut costs and saved the government a great deal of money, the findings of the interviews revealed contrary results regarding project members' satisfaction with motivations and incentives. There was a consensus among the interviewees that the rewards received were worthless and far below the level of achievement in the project. In this respect, The DIT related the insufficient rewards to the shortage of the national budget:

“There have been training sessions given to the staff, but there have been no monetary rewards. This could be because of the shortage of the national budget.”

The MR did also highlight the efforts of the project team, and the impact and achievement of the project, while all these were not reflected in job satisfaction. She noted:

“Regarding rewards, the project team worked very hard on the project with full passion and energy. Rewards never corresponded to the level of efforts. In fact, we won several international prizes but have not received any rewards.”

Although the project saved the government millions of riyals, the excuse of the budget shortage persists.”

The project team worked towards finding a compensation system to motivate the staff and encourage them to stay in their work. Nevertheless, those efforts never become successful, which may jeopardise the future of the system. The IPM, when asked about the appraisal system applied to the InvestEasy team, replied:

“They follow the traditional way of appraisal. We proposed a post-implementation plan to manage and operate InvestEasy after completion, but this plan did not take materialise. Currently, nobody is managing it, and this may have negative implications in the near future.... The management used to reward employees based on how many transactions they did, but not on the quality or impact of their innovative work.”

The IPM elaborated further and described a scenario that had been impacting his social life as a result of the inflexible work system regarding the implementation and operation of the InvestEasy system.

“Motivations and incentives are absolutely negative. The time spent on the project has been affecting our personal lives and has negatively impacted our relationships with family and friends. It caused a disaster to our private and social life. During the project, I could see my family just once a month and I missed many social occasions, thus it weakened relationships with my relatives.”

Moreover, such a situation had been stressful and even left a negative impact on health. The IPM added:

“There is also an impact on health, because of the stress, that nobody cares about. They care more about our discipline at work, although most of the time I leave work at midnight, but they still get upset when they see me coming late the following morning. They count half an hour in the morning but not the extra time I spend working late on the project.”

5.5.3.3. Facilitating Conditions

- **Networking**

MOCI worked toward facilitating the work of collaboration in the InvestEasy project, and as it is a national strategic project, multiple channels were used to communicate with the key partners and the stakeholders. For example, mass media like TV and radio were used to inform the public about the updates and progress of the project and spread awareness about using the e-Services. In this regard, the IPM stated:

“We also use mass media like TVs, newspapers and radios as well as workshops in related exhibitions, as well as pulls. We analyse pulls to inspect and improve the services. It is a huge project with very few resources.”

In addition to this, the project executive team used the social media tools to stay in touch with each other while engaging the investors, as reported by the IPM:

“We also use a WhatsApp group internally and for communication with the external stakeholders, as well as Twitter to publish news and inform about regular updates, happening in the business environment, and announcements.”

Furthermore, continuous meetings and social interactions during the project had strengthened the inter-organisational relationships, especially with those organisations that had a shared interest in the InvestEasy outcome and the data being shared. In this regard, the MR noted the importance of socialisation, which not only brought the parties together, but also extended to the social ties of personal networking by saying:

“Networking was very effective. The project has strengthened our relationships and we see ourselves as one family. Plus, we share social occasions.”

In the same vein, the IPM highlighted the strong and close social relationships established with the key partner of the project which helped MOCI to run the project and resolve the emerging issues. The IPM described:

“Networking – we have a good relationship with the CEO of ITA and so ITA is helping us a lot.”

- **Trust**

Trust is a critical factor that can facilitate effective communication and information sharing between organisations. Inter-organisational trust stems from good inter-

organisational relationships. Also, the appropriate regime of authority contributes to trust building among public sector organisations participating in inter-organisational information sharing. In the InvestEasy project, the presence and clear role of ITA, as a statutory authority and IT infrastructure provider, helped in building a shared trust among all data sharing parties. The ESE clarified and appreciated the role of ITA in diffusing trust among all:

“There is trust, and the effect is highly positive. The data of InvestEasy are shared through ITA with high trust.”

The IPM also indicated that inter-organisational trust had grown as the project moved on and became stronger as the outcome was observed, and the benefits were realised. While questioned about trust, he responded:

“After a successful run of the project it [trust] became high; highly positive.”

- **Stakeholders Engagement**

The InvestEasy project is one of the national primary initiatives of the e-Oman strategy that is mandated by the Cabinet. Inter-organisational integration and collaboration were essential elements of this project, since commercial registration and business licensing is a shared partnership process among multiple government organisations.

Both the steering committee and the work teams included stakeholders from all participating organisations while engaging the primary stakeholder, meaning the investor, in all stages of the project. The VPM, when asked about the engagement of the stakeholders, replied:

“We took feedback from multiple stakeholders of various demographic origins to understand how they like a fully automated system and its usability. The work has been shared among experts and stakeholders.”

The IPM described stakeholders’ involvement in the project, including the investors and the public and private organisations interested in doing business:

“We have been involving the private sector throughout the project, such as Sanad offices, free zones, lawyer offices and everybody else touching the business environment.”

The MR also pointed out that physical visits to stakeholders' locations, to hear users' feedback, had been occasionally arranged and led by the MOCI undersecretary who had been chairing the steering committee of the project. She reported:

“We also organise visits, led by the undersecretary, to the regional branches to meet with their staff and hear their concerns and challenges, and collect their views and feedbacks and so to improve the service.”

5.5.3.4. Attitude and Behaviour

• Technology Acceptance

Accepting the new technological solution (i.e., InvestEasy system) met with some resistance from some internal staff and other participating organisations. The reason behind such attitudes and behaviours was multifaceted. It could be cultural or political, for instance, as already discussed above, or it could even be stemming from the lack of technical knowledge of the individual, lack of engagement in the project or low technological readiness of the organisation. For example, the DIT reported that there had been resistance from some staff and members of project teams which resulted in promoting negative propaganda about the project to the investors. He commented:

“There has been resistance from some members of the project teams... There was resistance from many staff who also misrepresented the project to the investors. This has a highly negative effect.”

Likewise, the IPM shared that same view about resistance to change which seriously impacted the credibility of the system, as he stated:

“There is resistance to change inside and outside that affects the credibility of the project. Some staff have relationships with other staff in other organisations and with investors, and they give a negative image to them and to the public.”

Moreover, there had been some resistance related to stakeholders' engagement. For example, the MR noted that there was a lack of engagement of some staff from the beginning of the project which resulted in low collaboration from them:

“There was internal resistance from the ministry, particularly staff who were not engaged in the project from the beginning, and their perception now that the system is not theirs.”

The other issue was that some other staff were reluctant to provide their feedback. They offered various excuses, for instance being busy. The MR added:

“Another thing is that some staff, although invited to give their feedback, do not take it seriously and pretend to be busy in other tasks.”

• **Perceived Costs and Benefits**

The InvestEasy project was expected to reduce a large amount of money and paperwork, as well as to cut the time needed to register and start a business. A prior study, conducted by MOCI, found that the amount of paper needed for business transactions was huge, as indicated by the MR:

“We did a research study and found that the amount of paper consumed in one year could cover the ministry building up to the fourth storey.”

One reason is that the same documents are requested from investors on every visit, not to mention the time needed to locate other related documents and the cost of printing and keeping them safe.

Apart from paper, and time reduction, there were other kinds of benefits perceived by most of the MOCI participants, including cost cutting, return on investment, operational efficiency, improvement in data quality, knowledge transfer and more. For example, the ESE briefly mentioned the perceived benefits as:

“Paperless and money savings, better data quality, less operational load.”

Meanwhile, the VPM perceived the cost of implementation as a barrier. He pointed out that the cost had been increasing as the project advanced and the application grew larger. The VPM stated:

“Cost was a barrier and a major factor as the complexity of the application increased.”

On the other hand, the IPM mentioned several benefits perceived from InvestEasy implementation. For instance, regarding operational efficiency, he contended that the implementation resulted in removing the bureaucracy of the process and unwanted routines and saving investors' time and effort. He stated:

“We eliminated a lot of unnecessary activities and developed a self-service portal, which means that one doesn’t have to go and visit the ministry to register his business.”

The IPM also noted that gaining new knowledge from the project and creating inter-organisational relationships were among the perceived benefits:

“We got a lot of experience and knowledge from this project, such as improving our PM skills, and relationships with other organisations.”

Furthermore, the IPM indicated the cost savings resulting from inter-organisational data sharing in the last five years, and the implication of this on the private sector organisations. He reported:

“The savings resulting from sharing data electronically in the last 60 months is estimated at over five million Omani Riyal (ROI). It is like half an Omani Riyal per single data sharing request. The implication of InvestEasy benefits has also impacted private sector organisations, by which four million Omani Riyals have been saved.”

As a result of the benefits realised from the implementation of the InvestEasy project, the global implications are that Oman’s rank in the ‘starting a business’ indicator of the World Bank has jumped from 159 in 2016 to 66 in 2017, while regionally (i.e., Middle East and Arab countries), Oman has been currently ranked number 1. The IPM noted:

“These indicators have been targeted since the beginning of the project.”

• **Perceived Risks**

All substantial technological transformations are accompanied by risk. In the case of InvestEasy, two forms of risks were perceived by MOCI informants. The first was the one indicated by the VPM regarding the vendor’s support to mitigate the risk of system failure. The VPM noted:

“We have also purchased vendor support (support agreement) for this solution in case of software bugs to mitigate support risks.”

The other form of risk is related to how the data provider organisation could maintain the availability of the data and sustain the data sharing mechanism while the

InvestEasy system is operational. The risk of system failure in these organisations is high, as indicated by the IPM, despite the high technological readiness of the system from the MOCI side. This concerns MOCI, especially if the data are requested by other organisations. The IPM stated:

“Data sharing using Webservices is a good standard solution that can wrap heterogeneous systems. However, it also depends on the readiness of other parties and the availability of their systems round the clock. We are sure that our system is available 24/7, but we are not sure that other systems are functional all the time.”

5.5.4. Analysis of the Effects of the Technological Factors on e-Government Implementation and its Success at MOCI

5.5.4.1. Technological Readiness

• Technical Capacity

The findings showed that technical capacity is a very critical factor in crucial projects such as InvestEasy. The capacity of technical support had been provided by the same vendor who implemented the system. However, the vendor tended not to transfer the technical knowledge to the project team and aimed to stay longer in business, as reported by the ESE:

“... However, there is an issue of knowledge transfer in a way that vendors want to retain government dependency upon them, and we have a lack of nationally qualified professionals in the IT industry in Oman.”

The IPM noted that a post-implementation support period was purchased from the vendor to avoid the risk of system failure and long downtime. This matter has already been discussed above under perceived risks.

The IPM claimed that MOCI started the InvestEasy project having a clear vision of what they wanted to achieve, and their requirements were very clear. Nevertheless, there was a big challenge in dealing with the business analysis capacity of the vendor. The vendors, and especially those coming from Europe, thought that the local team had little knowledge of technology. But, controversially, the vendor team seemed to have a lack of business and environmental knowledge about the project and often consulted the local project team to learn how to do things. The IPM ascribed this

vendor struggle to the improper transition from the business analysis stage to the implementation stage while neglecting the outcome of previous business analysis efforts. He stated:

“There was a consultant before who did a business analysis, and that consultant was excellent. The vendor was supposed to work with them from the beginning. However, the vendor did not take the outcome of that consultant for the sake of cost reduction. So, they struggled a lot at the beginning and especially in the first and the second year, until they called the same consultant to help them do the work. Business analysis is not only business process analysis and simplification. It also includes understanding the legislation and law, and the regulations we have in the Sultanate.”

Meanwhile, there was an agreement among MOCI interviewees that there was a lack of national qualified professionals in the IT industry in Oman. An example of concern about resource scarcity was given by the IPM as he elaborated:

“Webservices is a solution, but they do not have people to work on integration. So, the resources are barriers as well.”

This was one of the challenges that led the e-Transformation team in MOCI to hire an external vendor to implement the system and transfer technical knowledge to the local project team. However, as observed by the researcher, there had been an issue of knowledge transfer in such projects in a way that the vendor tends to retain government dependency upon them. Nevertheless, the vendor’s manipulation did not prevent project members from learning from the project. The executive project team had also been striving to disseminate knowledge and awareness among all members and stakeholders of the project including the investors. As part of this, the team developed plans and held multiple awareness campaigns and training workshops about the use and benefits of the InvestEasy system. In this regard, the MR stated:

“We also conduct workshops to teach how to use and deal with the service. Local training is ongoing with the staff in the ministry and regional branches. We use practical sessions to make them familiar with the systems and, at the same time, test and discover bugs.”

• IT Infrastructure and Interoperability

MOCI was found to be in high technological readiness, supported by the national IT infrastructure provided through ITA. The IPM described the infrastructure of the data sharing platform (ESP) hosted by ITA as a comprehensive one, by stating:

“The architecture of integration is quite comprehensive. We obtain and share part of the data through the ITA data hub (ESB).”

MOCI had also worked toward maintaining a low cost and standard interoperable system solution for Web development, so the same could be used by other participating organisations. The VPM indicated:

“We use solutions that are not vendor-locked, not commercial in nature. They are free open source solutions to avoid high cost and vendor dependency. The open source we have used is not limited to the number of integrations and number of users and is almost zero cost. It is also adopted by the community in the sense that is very secure, which is the main concern. It is a proven solution that has been used widely in different e-Government applications worldwide. Even though it is open source, it is a market leader, proven, certified and tested by organisations.”

However, the analysis of the interviews revealed a lack of infrastructure and system readiness in some participating organisations that were non-primary stakeholders. MOCI participants pointed out the issue of IT infrastructure and interoperability and its implication on the project and system operations. For example, the DIT explained the lack of computer information systems in some of the participating organisations:

“Technological readiness had negatively affected integration since some organisations lack the readiness and some do not have information systems at all. It was a barrier and caused delays in the project due to the intensive discussion and low cooperation from some government organisations.”

A similar issue of systems readiness was pointed out by the IPM, where some organisations, although they were not ready, hesitated to use InvestEasy as a single window of services. He commented:

“We have the barrier of technology. Some organisations do not have systems at all, they are not ready, although they can use InvestEasy to execute their

process, but they still do not want to. Their excuse is that ‘we are not ready’. This is one part. The other part is that they have a system, but their system does not have the required compatibility (or readiness) to integrate with our system.’

5.5.4.2. Data Management

• Data Quality and Standards

The interview with the DIT identified a lack of data quality regarding the investors’ records as one of the challenges the project team faced. However, the integration with the main data providers helped to overcome the problem and clean the data before they got into the InvestEasy system. The DIT noted:

“There was a lack of quality data about the investors in MOCI. So, we formed a team for data cleansing and created a data model for data standardisation to verify and validate incoming data by integrating with ROP Civil Status Registry (CSR).”

In addition, the data required to be commonly shared at the national level were revisited and further attended for cleansing using Webservice technology. And so, further data requests or sharing had been restricted to transfer through the ESB with strict cleansing rules defined in the ESB. The DIT added:

“A Webservice for data cleansing and inquiring was then created and deployed in the central data hub in ITA (i.e., ESB). Hence, all inquiries of investors’ data must go through ESB.”

Furthermore, the IPM highlighted the use of Webservice technology as a de facto standard for maintaining data standardisation across the participating organisations:

“We use Webservice technology for integration by adopting open source development frameworks to keep it flexible with the various data requirements of the stakeholders. For example, integration with OCCI requires defining five data fields, while MOMP requires ten data fields.”

• Data Security and Privacy

Since InvestEasy deals with business aspects, MOCI professionals viewed most of the data used and exchanged across organisations as public data that can be declared at any time as the business law suggests. Meanwhile, data that are seen as restricted and inaccessible to the public are protected and safeguarded. In this sense, participants

such as the MR believe that there was no major issue concerned data security and privacy and thus this sub-factor had no particular influence on the implementation of the InvestEasy system. The MR reported:

“Regarding data security and privacy, we aimed at transparency and, according to business law, we consider most of the business data as public data that must be declared. However, there is confidential information that we keep secure and always monitor whether it is abused. The influence is none.”

Moreover, InvestEasy had already been connected with the ESB integration hub, as aforementioned. The ESB hub had been supplied by data encryptions and anonymisation protocols as confirmed by ITA professionals. In addition to this, the ministry had been committed to following the security and confidentiality standards imposed by the ITA to provide infrastructure for data sharing and secured transactions, which included the e-Payment portal and PKI digital signature for user identity and confidentiality. Despite this, the ESE contended that data security and privacy harmed the InvestEasy implementation because many organisations were reluctant to share data as they were not confident about this particular issue:

“Data security and privacy have a negative effect because many organisations are reluctant to share data, except for some organisations which also allow sharing of open data, even though ITA is trying to ensure security and privacy through the integration hub.”

5.6. Case Study Analysis: NCSI

This section presents the findings of the study conducted at NCSI. The process of investigating the effects of socio-technical factors on e-Government implementation and its success at NCSI was carried out using the outcome of the semi-structured interviews, conducted on NCSI premises.

NCSI Case Study	
Management Level	Number of Interviewees
Senior Management	2
Middle Management	2
Technical Specialist	3
Data Analyst	3
Total	10

Table 5.5: Types and Number of Interviewees at NCSI

The interviews were conducted with ten NCSI participants from three organisational levels including senior management, middle management and technical specialists, as shown in Table 5.5. Five interviews were tape-recorded, while in the other two the researcher only took notes as the respective participants (both from the technical specialist level) opted not to be recorded. The interviewing process started with the focal point of this case organisation, whose position was Director General for Census and e-Census2020 Project General Manager (PGM). Then the snowballing technique was followed to identify the rest of the participants. All the interviews were transcribed, translated into English (for those conducted in Arabic) and reviewed by the researcher before analysis. The documents were collected during and after the interviews took place. They were used to support the interview findings and to collect background and contextual information about the case organisation.

5.6.1. NCSI Background

NCSI was founded by a Royal Decree in 2012. The centre's structure and its core business were specified by another Royal Decree issued in 2014. The main goal that the centre was established on is to satisfy the needs of governmental organisations, and especially those involved in the planning of statistical data and information. The number of personnel employed at NCSI is around 200. Based on the Royal Decree, NCSI is the authorised unit for providing national data. The centre specialises in statistics and data provision, as it has the expertise, tools and standards for data collection, analysis, and reporting.

In the general sense of the term, all the products of the NCSI are considered services. The services are mainly classified as forms of requests: data requests or requests for conducting field surveys. NCSI provides statistical services to individuals and institutions, such as to citizens, decision makers, officials, and researchers. It also has other specialised services available on its website (www.ncsi.gov.om). The website is accessible to all citizens and, globally, to any person inside or outside the country. It has statistics and information that interest communities and individuals.

The statistics are divided into two sections: economic and social. Economic statistics focus on economic matters, such as producer and consumer prices, inflation index, national GDP index, oil price index and many economic indicators from which the

centre draws many statistics. Social statistics relate to the aspects closer to individuals, such as labour force, culture, expenditures, household income and turnover. There is also administrative data, which is always rich because it is actual data based on database transactions.

On the other hand, field surveys are vital and are a rich source of information. They are also of two types, economic and social. For instance, the sports clubs in the Sultanate are an example of a social survey, whereas labour force surveys, household expenditure and income surveys, and consumer price surveys are examples of economic surveys.

5.6.1.1. e-Government Implementation and Readiness Status at NCSI

NCSI began as paper-based for a short time. However, in 2014, the centre started using information systems and has never used paper again. In 2016, new modern information systems were developed.

Gathering data is the first step of data provision. In the past, data had been transferred on paper or through magnetic compact discs (CDs). However, this has changed, and at present, data transfer has been automated and there is a daily population of the data that comes from various organisations and goes directly to the centre's databases and is instantly presented in a single window called 'Data Portal' (data.gov.om). The Data Portal is available online and can be accessed from anywhere. The sections of the portal have an attractive design populated with finished data and presented in various formats where users do not need to create further tables/matrices. There are also smartphone applications by which the same data can be viewed.

NCSI had embarked on electronic solutions to assist in publishing data to fulfil various needs. There had been a high demand for data, particularly through the Data Portal. A recent innovation is called 'knowledge screens'. These screens are available for the public, through which they can view data. They can also be used by official media directly on live TV. There are also screens with restricted access which are used by state ministers and decision makers. For example, members of state and Shura (democracy) councils can view them online with live data.

Public organisations that are involved in planning and decision making are the most demanding for data, particularly instant live data. To respond to data request demands in a timely fashion, traditional inter-organisational correspondence and offline data

transfer were replaced by electronic links. As a result, the traditional practice was drastically reduced which, in turn, saved time, and eliminated redundant data and validation errors. The electronic link with the governmental organisations started with the Council of Ministers Office (i.e., the Cabinet). This was because the Cabinet requests for data had been quite demanding.

Internally, all NCSI operations are electronic. The centre has modern management information systems that comply with civil service law and executive regulations. NCSI officials asserted that the centre had been on high e-Government readiness. They believed that they had exceeded the e-Government transformation stage and are currently in the e-Government integration stage. All NCSI systems and processes were fully integrated. The key service requests (i.e., data requests and requests for conducting surveys) had all been done electronically (online). In the field surveys, the centre uses handheld electronic devices, either tablets or iPads, to quickly collect data electronically. This electronic collection adds the advantage of instant data checking from the field, as they come as live data of high quality. The electronic procedures are published and clear.

There is a strong collaboration between the centre and public organisations in transferring data as well as reviewing it. Over time, more organisations join the electronic integration with the centre. Through the e-Census project, discussed next, NCSI officials hope to make a wider network of electronic links with other respective organisations.

5.6.1.2. The e-Census2020 Project

Commenced in January 2017, the main purpose of the Project of Electronic Census of Population, Housing and Establishments 2020 (e-Census2020) is to electronically manage the census process and publish census results for the public. The project is part of the national initiatives of the e-Oman strategic e-Government plan.

The e-Census2020 is independent, pursuant to the Royal Decree that formed the census higher committee in partnership with government agencies and a private company to design and programme census databases. The project has also financial and administrative independence, and it is exempted from the laws and regulations in force under the general laws. Most of the government institutions that produce data are members (stakeholders) of the project. This national strategic project differs from

previous census projects in that it relies on electronic (and non-electronic) records, not on field surveys with a focus on electronic records.

The higher committee of the project, as delineated by the Royal Decree, was chaired by Sayyid Haitham Bin Tariq Al Said (who later became the Sultan of Oman) and its members were a group of ministers. Under the higher committee, there is a technical committee chaired by the Executive Director of NCSI under which there is an executive team for the project. A general manager was assigned to the project who also heads the project team. The team includes two project managers: the technical project manager and the data collection project manager.

The higher committee meets from time to time to decide on big issues. The technical committee convenes every month with a membership of general managers from different organisations. They meet and discuss important matters in light of which they take decisions to follow up the implementation. The DGeGS, of ITA, is a member of this committee. The committee also includes members from ROP, the Ministry of Education (MOE), MOHE and MOH. There are also nine members of secondary stakeholder organisations involved in the project.

Concerning the primary and secondary stakeholders, there are two corresponding data sources: main and secondary. An example of the main source of data is that from PAMR. As for the secondary source, the team brings and compares data from different organisations, such as MOE on teachers or from pension funds. However, at the same time, the team works with PAMR and requests it to link to pension funds. The team started working with these organisations to achieve electronic linkage between them. Here, ITA plays a key role in the integration between these organisations. Every primary organisation has a work team with the following tasks: collecting data, developing mechanisms for data mapping and validation, and supplying corrected data and evaluating its quality. The technical committee decides on ownership and responsibility of data.

NCSI works to archive non-electronic records (by transforming them into electronic data) in collaboration with the data owners' organisations. This first step is to ensure the comprehensiveness of the data and coverage of all citizens and residents. There are also data on housing and establishment in one of the project stages. The census process also involves data correction. After the coverage of the data for most of the

population is ensured, correction is carried out because sometimes data are not compatible amongst institutions. If there is evidence that the data are incorrect, they are returned to the relevant institution for modification through a full team of over 70 people working for the project inside the member organisations.

Before the start of the project, a number of visits were organised to Estonia to learn from its experience in similar projects. This was followed by a preliminary study, in the light of which the centre appointed an international consultant who conducted an analytical study of the project risks, challenges and expected costs.

The database architecture design comprised three databases: population, housing and establishments. All these databases feed into the central one, which is the e-Census database. The population database included demographic, educational, occupational, etc. data about each citizen or resident in Oman. There were other secondary databases such as the labour database, and the education database which was divided into two parts: part for school students (with their historical data) and the other part for higher education students.

Regarding the housing database, there was a problem concerning the addresses. The project team faced a big challenge in this regard, i.e., addresses (there had been no address system in Oman before). Therefore, the centre established another project for addresses. This project is ongoing, and it has been under the jurisdiction of the e-Census2020 project with an independent team.

The address project was executed in two stages. The first stage was to identify the coordinates of every house, and it was carried out in cooperation with Nama (a national electricity holding company). This is because Nama holds the accounts of electricity users with their location coordinates. Every establishment or house has an electricity user account with the associated location coordinates through which each account is connected to the owner/landlord or tenant. These accounts would be connected to the Population and Housing databases. In the second stage, the database would be linked to the Enterprise Service Bus (ESB) in ITA so that any (linked) organisation can read the data via the ESB. Then the Population database would be made accessible to member organisations, so every organisation can update it. In this case, there would be an owner of each data item. For example, MOHE for a higher education data item, the Ministry of Social Development (MOSD) for a data item on the social status of

persons with disabilities, PAMR for the labour force and so on. Part of the address project fully codifies the Sultanate. The address project lasted after the main e-Census2020 project was completed. It also involved stakeholders from state municipalities whose key role was to restructure the addresses with a unified coding scheme across the Sultanate.

The vision of the e-Census2020 project is that the next censuses will only be an update to the census database. In other words, publishing census data will be a matter of pressing a button. It was planned that all census participating organisations are to be connected electronically via OGN, and data exchange happens through the ESB. Currently, the concern of NSCI is the accuracy of the data. Later, after data accuracy is confirmed, the centre will get in touch with the community and the concerned institutions, those who might have particular views of the census system and ways to develop it. The centre also plans to communicate with the investment institutions and companies, because census data are of interest to them and will serve them considerably. Therefore, NCSI strives to provide the largest amount of data, not necessarily only in 2020, because many investment institutions want to know specific data and access thereto was not easy before. Therefore, a single point of access is useful for them. It was planned that the result of this e-Census would have been published by the end of December 2020 or maybe before, because the rest of the Arab Gulf countries are seeking a unified census in a specific month. This mandate therefore marks the end of the e-Census2020 project.

Since the unit of analysis in this study is e-Government implementation projects, the next three subsections (5.6.2 – 5.6.4) investigate the effects of socio-technical factors on the implementation of the e-Census2020 e-Government project. These factors have been subdivided into three dimensions, which are environmental, organisational, and technological.

5.6.2. Analysis of the Effects of the Environmental Factors on e-Government Implementation and its Success at NCSI

5.6.2.1. Pressure Forces

- **Institutional Isomorphism**

A strong influential coercive force is the Royal Decree that formed the project and mandated its mission, structure, and outcomes. This was confirmed by the PGM as he stated:

“The Project of Electronic Census of Population, Housing and Establishments 2020 (e-Census2020) is independent, pursuant to the Royal Decree that formed the census higher committee in partnership with government agencies and a private company to design and programme the databases.”

Another important coercive force is the increasing demand for data from other organisations, however, before launching the project. This had been a driving force to create electronic online channels for sharing data which resulted in saving the time and resources of the centre. The Director General for Information (DGI) in the NCSI explained the demand on data by saying:

“As a practical regime, we found that as we provide data, we notice increasing demands on new data and its details. We noticed that our time was mostly spent on the activities of providing data. Therefore, this motivated us to adopt information technology to implement electronic online solutions to help us get data from the respective organisations and provide it to those who need it.”

Meanwhile, the e-Government transformation strategy, mandated by the government, for transferring to e-Government services contributed to this type of institutional isomorphism (i.e., coercive force).

Likewise, the memetic pressure force was present as one of the institutional Isomorphism, where the NCSI opted to save time and learn from other experiences to expedite implementation. The PGM, when asked about the benefit the project team had gained from international experiences, replied:

“Yes, we benefited. We visited Estonia because it has a similar experience.”

Besides the coercive forces explained above, there was also normative pressure both from the centre's top management and from its own employees. This was clearly stated by the DGI:

“The change started from His Excellency the CEO's vision. So internal pressure has been more influential than external. The change has been influenced by a strong internal desire.”

The above statement indicates that the normative isomorphism pressure, which relates to the centre's own strong desire, was more influential than the coercive and memetic.

- **Media and the Public**

Regarding the effect of media and the public, the data revealed that there was no particular effect on the e-Census2020 project. This was clearly stated by the PGM:

“The only pressure coming from social media is specifically from the society. People are not convinced of why we ask them to update their personal data regarding their address through supplying their electricity account. We don't have other pressure from media and the public.”

The same was also confirmed by a data analyst in the project, as he mentioned:

“The media did not have a prominent role in the electronic census project, as it was clear that there was no promotional aspect during the course of the project, and most of the people did not know much about the census, to the point of some of them asking: When will you reach our areas for counting?”

- **Economic Conditions**

The e-Census 2020 project had also been, to some extent, affected by the economic conditions, particularly the current global financial crisis. The effect had negatively impacted the comprehensiveness of the electronic integration with the data providers and slowed down the rhythm of the project. These were quite evident from the participants' voices. For example, when the DGI responded to the researcher's question regarding the comprehensiveness of the electronic integration and data sharing, they answered:

“Data sharing or process integration means that databases should be linked so that they can exchange data. This implies high cost and requires allocation of budgets, which is difficult, especially in the current financial crisis.”

In the same way, the PGM while answering whether the address sub-project could be ended before the main e-Census2020 project, commented that due to the lack of budget, the project might not hit the designated deadline. He noted:

“We hope so. However, because of the budget, there was a delay.”

However, the initial budget of the e-Census2020 project was retained and blocked for the project. In addition to being a strategic national project, e-Census was also considered vital in helping the government overcome the economic turndown of the country by providing important economic KPIs, helping to monitor the economic status of the country. The PGM pointed this out by adding:

“To monitor such a crisis, the country needs to see data, and the government recognises this. So, it considers this project so critical because it is one of the vital projects to pass through this critical moment. They need accurate data to make appropriate decisions.”

5.6.2.2. Policies and Legislations

- **Institutional Legitimacy**

NCSI was formed by a Royal Decree which also granted the centre the required institutional legitimacy to share and exchange data between any government organisation. The fact of this institutional power was addressed during the interviews with the DGI, the PGM and the Project Technical Manager (PTM). Regarding obtaining data from the public organisations, the DGI stated:

“NCSI is governed by a statistical law (enacted by the Royal Decree). This law supports us and gives us the power to obtain data.”

The PTM noted the same while speaking about the legislative rights of data sharing:

“This is a legitimate and presumed right...”

The PGM also pointed out the centre’s legitimacy when getting the needed resources from other public organisations to nurture the project with the needed expertise and help in carrying out the project tasks. He commented:

“We also took temporary human resources from other entities of the government. For example, from ROP, the ministry of transports and the ministry

of sports affairs to help as do the project tasks. All these staff members will go back to their original positions when the project is over.”

On the other hand, publishing and providing data to the government organisations, the public and other institutions, preserves the same rights. This, in particular, was stated by the DGI:

“Based on the Royal Decree, we are the authorised unit for providing national data.”

Furthermore, the institutional legitimacy was supported by a statutory authority, which is ITA, along with the top executive’s involvement that influences the governance structures in the project. This significantly enabled and enforced data exchange between NCSI and other public and private organisations.

- **Regulatory Frameworks**

Since e-Census2020 is a statistical project and largely depends on data sharing and integration, the availability of a regulatory framework for the specification of data sharing legislation and standards, whether on the state or at least on the project level, is of vital importance. The presence of a legislative framework in the project/centre level was noted by the PTM:

“Internally, the NCSI has the legislative framework and there is a statistical law to be issued shortly. There was a law issued in 2001 that stipulates data confidentiality, and we are committed to keeping the confidentiality of data.”

Similarly, a data analyst also noted the commitment to a standard framework of legislations throughout the project while sharing and disseminating the data:

“There was a plan and a framework to follow from the beginning of the project in exchanging the information and preventing the loss of any of this information. Also, data confidentiality was the most important issue in the implementation of the e-Census2020.”

However, it was observed that on the cross-organisational level a regulatory framework was lacking, as the PTM indicated:

“It is true that some parties do not have the legislative framework...”

5.6.3. Analysis of the Effects of the Organisational Factors on e-Government Implementation and its Success at NCSI

5.6.3.1. Managerial Capability

- **Leadership and Support**

Evidence from the interviews showed that the e-Census2020 project had been strongly supported by the senior management internally and at the national level by the Cabinet. The higher committee was chaired by a VIP who is a member of the royal family and the Cabinet. In this regard, the PTM stated:

“[It is] supervised by the National Centre for Statistics and Information, including the CEO, and of course it has a supreme committee headed by His Highness Sayyid Haitham bin Tariq.”

The database manager (DBM) of the project highlighted an example of the higher committee support:

“The senior committee decides on ownership and responsibility of data.”

The technical committee, as well, meets regularly to follow up on the project progress and decide on the critical issues concerning implementation. This was indicated by the PGM:

“I am the Vice-Chair of the Technical Committee. His Excellency [the CEO] is its Chair. We meet and discuss the important matters, in light of which we make decisions to follow up the implementation.”

Part of the leadership was leading the stakeholders, through collaboration and conflict resolution, whether internally at the centre or across other participating organisations including the vendor. Such leadership practice had motivated the stakeholders and contributed to their cooperation and response. As a result, the project had been moving steadily. This kind of leadership practice was described by the PGM:

“There are a lot of things that make this happen, such as resolving disputes, motivations, convincing and governance. We had to discuss the legal aspects, the national aspects, and the consequences. When they understand and realise the benefits to the country, they cooperate better. We have also to know the impact on the cost and the extra resources needed. Division of cost sometimes

not clear enough, but we also share the cost with these parties to make it happen.”

Furthermore, regarding resolving conflicts between the stakeholders, the PGM commented:

“If there’s any dispute with other organisations, we initially look back at legislations and then we analyse the dispute to see whether it is a personal or organisational conflict, and then work toward resolving it with all respective stakeholders and also with the vendor.”

Such leadership capability was also confirmed by the Project Management Office Manager (PMOM) of the project by describing an incident between two stakeholder organisations:

“We once encountered a dispute between two stakeholder organisations where each organisation claimed to be the owner of a certain data item. This data item is found in both in a different format. We coordinated between the two and tried to achieve a unified format.”

- **Strategic Planning**

Strategically, the e-Census2020 project followed e-Oman strategy and it was mandated by the initiatives of the strategy. It is one of the key core national projects sponsored by the Cabinet and supported technically by ITA and other public organisations with the available national technical resources of IT infrastructure and human expertise. The centre had been striving to align with e-Oman strategy. The DGI, when asked about whether having a transformation plan which aligns with this strategy, responded:

“We do have.”

In this respect, the e-Census2020 project had been aligned with, and contributed to achieving, the goals of Oman’s strategic vision 2040. The PGM commented on the strategic alignment by saying:

“We try to align our strategy to the socio-economic indicators of the government. Our scope is to provide a data basket that complies with the United Nations and GCC Census standards, first of all. We also added new indicators

that inform the strategic vision 2040. For example, KPIs of job seekers, family incomes, etc.”

5.6.3.2. Structure and Culture

- **Organisational Structure**

NCSI participants uncovered some issues related to the existing organisational structure in which each organisation had its own mode of operations which was isolated and depended on its own interests and priorities. This had affected project execution and thus impacted implementation. The Project Management Officer (PMOF) raised this issue and presented an example of a typical situation:

“If you graduated from a university, it would take the Ministry of Higher Education [MOHE] over two weeks to realise that you had graduated. It is not connected; it is not a unified system. Each university operates in its own systems, and when a transaction happens in a university, it’s not reflected in MOHE on the fly.”

Similarly, the DBM in the project shared the same concern of isolated structure and focus on own interest:

“Project importance is not realised by organisations, and this affects data quality.”

- **Organisational Culture**

The culture of the participating organisations played a key role in influencing e-Census2020 implementation due to the culture inherited in organisations where data sharing and integration culture were not compromised as a normative practice. There was a consensus agreement among all e-Census2020 project managers in this regard. For example, the PGM identified one of the issues related to internal organisational culture, although expressed as rules, in one of the organisations:

“There are still some such organisations. I mean, for example, there was an organisation that refused to link with another one because its rules stated that there should be one owner of the data.”

The same was elaborated by the PTM about the organisational culture regarding information sharing in particular. This culture, as he believed, is hard to change and requires an organisational context that encourages data sharing practices in order to be embraced or enacted as a legislative policy:

“The culture of data and information sharing needs a lot of work, because in the past it did not exist. Everyone used to think that the data are under his control as his own and not subject to sharing... now this has become something gained, though not stipulated. For example, data sharing is an internal culture that may prevent or restrict the external sharing of data. However, there is no legal provision for this. This culture is formed by practice in the institution and then turns into legislation and laws.”

The PTM gave two other examples of this situation, where organisational culture could have a positive or a negative impact depending on the missions and operations of the particular organisations and their respective data sharing cultures. This data sharing practice may convert into a culture and is then enacted as a normative rule. For example, organisations that encourage a data sharing culture, such as data providing organisations, tend to embrace data sharing as a common practice, as the PTM elaborated:

“The data sharing culture was not present in the institutions, but it is slowly emerging. I am certain that the most important institution that spread the culture of data sharing in this field is the Royal Oman Police, which represents the most powerful governmental initiative. It made the NRS [National Registry System] available to the public and private sectors to share the data.”

On the other hand, other organisations which have risk-averse cultures may not be willing to share data. This causes reluctance to share data and information. In this particular case, the PTM pointed out:

“Some organisations are afraid when we mention sharing their data or consider them confidential. This is a negative indicator.”

- **Organisational Politics**

Political issues rising due to diverse wants, a shift of power, conflict of interests and fear of losing the institution’s image are very common in e-Government implementation projects. While such political issues have a negative influence on the implementation efforts, the e-Census2020 project was no exception. For example, some organisations tended to retain their data internally and did not have the willingness to share data, thinking that sharing data could disrupt the organisation’s

image and reputation. Although NCSI had the legislative framework, not all organisations had it. The PTM pointed this issue out by saying:

“It is true that some parties do not have the legislative framework, but sometimes it is a culture where they refuse to share the data, and the reason may be to preserve the prestige of the institution and its reputation.”

Another example is where some organisations view the development of integrated public services and data sharing initiatives as the shifting of resources such as financial assets and authority power. In such cases, those organisations wanted to retain client services in their premises. The PGM raised this issue during the discussion:

“They often said that clients come to finalise the procedures in our institution and then why does this service go elsewhere to other institutions.”

One reason turned out to be due to financial interests and fear of shifting money to a ‘central’ service provision, such as e-Census2020, as declared by the representatives of the respective organisations. This situation was explained by the PGM:

“For us, when we discussed such a case and did an analysis, we discovered that there was a side related to money collection. They indicated that they used the money in other services and thus if it goes to another organisation, they will demand it.”

- **Business Processes**

The deliverables of the e-Census project like databases and dashboards were not based on certain business processes, but were mainly about pulling sets of data from the data provider organisations, analysing them, and presenting them to decision makers and the public. Therefore, the development of software applications did not require BPR efforts. However, getting complete sets of quality data was not straightforward on some occasions and required changes in the data source. In this sense, the PGM stated:

“The e-Census is not a technology project, it is about gathering data, but we have to gather it through a certain process, and we have to make sure that the quality is high and is of integrity and there is a sort of enduring system. To ensure that we have to make some changes to the [data provider’s] process.”

On other occasions, pulling the data for its source required extraordinary efforts and entailed changes to data providers’ processes which also affected their

information systems. In this regard, the PGM noted some of the challenges faced during the electronic gathering of data by presenting an example about the validation of expatriate certificates for those who apply for a job in Oman from outside. This process was either lacking the proper structure or was not in place. It also entailed working jointly with three public organisations to define and map the cross-organisational process flow. The PGM indicated:

“For example, the process of validating expat certificates... We created a process map and escalated it to the senior committee so that the decision makers of the respective organisation can review, agree upon, and approve it. We worked with three different entities, MOMP, MOHE and ROP to build the process. We proposed a draft and shared it with them, and now they are studying how they are going to implement it. Of course, this process affects their system, and they have to go back and make the needed changes.”

Another example was the proof of address, which required a drastic reengineering effort across public and private organisations. One of the technical staff brought this up:

“We need to have proof [for the address], and we are doing this through the utility bills. There is a huge reengineering of this process across many public and private organisations, part of it is technology implementation. We also work with MOE and ROP to start looking at their systems to understand the changes they need to do and to speed up capturing the data.”

Nevertheless, business process issues had affected some of the data provider organisations but had no major effect on the main project.

- **Governance and Operations**

As indicated above, the census project had its own governance and security structures, laws, and legal settings, which are all independent, not seen by anyone because it is an independent project and has its own idiosyncrasies. The project had been governed and organised using international standard project management practices. Census deliverables had been stated and documented. The project governance structure of e-Census2020 followed the OeGF governance structure set up by ITA as indicated by the PTM:

“E-Census2020 complies with OeGF, and it is a standard followed by the contracted vendor. All participating organisations follow the same in their project work, escalation, and reporting. Data and integration standards have also been agreed upon between the centre and stakeholder organisations. Also, ITA was engaged and consulted in the integration architecture and design of standards. The final output sought from the project is the results of the census.”

The centre had set up a project management office (PMO) department and appointed a PMO manager. According to the PMOM, the governance structure included four committees: senior, technical, executive and media committees. There were also project teams, internal teams, and other teams in each participating organisation. There was a focal point in every organisation to handle and follow up on any requirement concerning their organisational teams. The PMOM also described the kind of standardisation followed in doing so and the assigned roles and responsibilities to the various work teams. He commented:

“There are also roles and responsibilities in each organisation set up and documented in the project charter so that we follow up and monitor its progress through the focal point. There are also monthly progress reports by every organisation briefing the project progress of the team. Related barriers and issues are escalated to the technical committee which meets quarterly.”

From the operations management point of view, the project tasks and activities were based on standard PMP practices. The project was piloted beforehand to assess the costs and efforts before the actual start, to have a better understanding of the requirements and have a clear statement of the hardware and software procurements. This approach was described by the PGM as:

“As for the pilot project mentioned, we made something called MVP (Minimum Viable Product). We do not buy large machines, rather we test them and see the needs. We have divided the work of the company into three stages. First, the stage of building the MVP followed by experiment and close familiarisation with the concept of this idea, and in light of this we identify the detailed requirements that depend on data volume.”

Project deliverables had been divided into sprints using the Agile methodology to get short-term results and gain management support as the project went on. This was explained by the PTM:

“We are currently using Agile for the implementation of the census system. The implementation shall rely on the Agile concept so that we shall have sprints and do not wait for the end of the journey but see results from time to time, because decision makers and officials wish to see quick and tangible results.”

The project structure also constituted large internal teams in the various participating organisations who mainly work on tasks related to data correction and validation. A special laboratory had been set up for performing data analysis to ensure data correctness by collaborating with the organisations’ teams. The PGM elaborated on the discussion regarding the project structure and management of activities, saying:

“Data correction takes place in the laboratory that analyses them. If there is evidence that the data are incorrect, we return them to the relevant organisation to modify through a full team working for the project of over 70 people (inside the organisations) whom we address for data correction. The organisation itself corrects because we want to reach the stage where these data belong to them. Therefore, this is a common process.”

From the financial perspective, the e-Census2020 project was sponsored by the highest government body in the state, which is the Cabinet. It had its own independent budget and had powers of financial dispensation. The PGM confirmed this by saying:

“Financing the project is through the state budget and has powers of disbursement.”

Nevertheless, the centre had been very careful about spending the budget. The centre officials had been spending it *“in a smart way”* according to the PGM. So, they worked to manage the project with a cost below projections. For example, they tried to exploit the vendor contract, which also included a training plan, while building their capacity to maintain the implemented information system. The centre had also managed to educate the data provider organisations on how to improve their data quality, which helped those organisations do part of their work and shifted some load from the centre, saving some (census) cost.

- **Motivations and Incentives**

Motivations and incentives act as a fertiliser to human individuals to always stay tweaked and have job satisfaction. Budget shortage due to the economic crisis has constrained the monetary rewards. However, the findings of the interviews indicated that motivations and incentives were given great emphasis and considered essential for the project. In this regard, the PGM explained how the centre could manage to keep the seconded staff of the different work teams motivated and satisfied while appraising their performance for their line managers, noting that the vast majority of the project staff were seconded (insourced/outsourced) from different public organisations and/or NCSI departments. The PGM indicated:

“Regarding motivation, this is a unique project and there is self-motivation in joining it as it adds to workers’ knowledge, since Oman is one of a few countries that has managed to make an electronic census. We use this fact to motivate the workers... there are also some kinds of monetary incentives for the seconded workers paid to them periodically, and feedback to their organisations on their performance.”

However, the findings revealed that incentives, particularly for the internal staff, were absent in the project. This was evident when interviewing two of the NCSI internal staff who were data analysts. One of them pointed out the workload and stress of the tasks in the projects by saying:

“The work pressure was very high and the time period for finishing the project was very short.”

The other data analyst frankly stated that she had not received any kind of reward:

“Unfortunately, I have received no rewards from the work.”

5.6.3.3. Facilitating Conditions

- **Networking**

The success of the public sector ICT projects that involve multiple stakeholders and cross-organisational collaboration and interactions, depends to a large extent on networking elements of strong inter-organisational relationships development and trust building.

NCSI officials had managed to informally establish good social ties with the participating stakeholders through networking to improve their relationships with them and employed such connection to enhance the project performance. The interviewees noted that periodic socialisation events and gatherings had been held with the local teams and also with the external stakeholders. For example, the PGM stated:

“We make social gatherings internal for our teams, and we also do this with the stakeholders. For example, we sit together with Nama and hold informal discussions.”

The officials at the centre also exploited such social events to introduce themselves and the project to the other interested parties in the public and private sectors, to exchange knowledge, look for sponsorship and spread awareness. The PGM described such events and interaction by noting:

“We also called all participating organisations and held discussions and brainstorming with lunch events. We also arrange workshops with big organisations, like PDO and ASIAD. The benefit is two-way, we exchange knowledge together, and we send our message through them and to others like their families and the entire society. We also arrange meetings with the regional governors. We use such things to spread information and awareness. We noted that people cooperate better in updating their demographic data.”

Moreover, the project media team arrange media campaigns through the different traditional and social media channels, so the census message can reach a wider group of people. The PGM added:

“We use media to our advantage. We try to send a message to the public from the different media channels such as TV, radio, newspapers, and social media. We have a campaign called ‘your data, your identity’.”

The implication of networking was notable, especially in enforcing trust and diffusing awareness among society members including students in schools and youngsters. This was evidenced by the PTM as he mentioned:

“One of the implications of networking is that it makes people feel they are part of the project and that it concerns them. Government officials also, like the Minister of Education in her statement at the beginning of the educational year,

emphasised the importance of cooperation with the census needs of the data. This would help a lot in spreading the message to the youngsters and their friends and families.”

• **Trust**

In the e-Census project, a huge amount of data was received from multiple sources. Here, trust plays a significant role in the acceptance of the data. The data may not always be taken for granted, but rather, need to be checked and cleansed. However, on some occasions, the incoming data are fully trusted, and hence, checking procedures are omitted. The facts collected from the interviews identified two cases where data could be trusted and taken for granted or undergo inspections.

On one occasion, the DGI described a situation where data did not meet the required international level standard, and therefore underwent further consideration. The DGI explained:

“There are internationally accepted definitions that PAMR should adhere to. For this reason, we don’t take data for granted from them, but after we validate them, we were able to identify the true job seeker category but not those who are on the job, and then we republished the data.”

On another occasion, the PGM perceived that the Civil Registry data received from ROP had been fully trusted as it had originated from this source. The PGM confirmed the correctness of such data:

“Of course, we are sure they are correct as for the main data items (name, civil number, birth date and birthplace).”

On the other hand, to ensure full confidence of trust to the data provider stakeholder organisations, one-to-one data sharing agreements were established and signed between NCSI and every respective organisation. The terms in the agreements determine how data are used and might be shared or disseminated. In this regard, the PMOM indicated:

“We also build trust that any data belonging to a certain organisation, we do not share or show to the others unless we are authorised to do so. There are also data sharing policy agreements with each and every stakeholder organisation.

This data sharing policy is on the project level while referencing the Royal Decree and the law of statistics issued by the decree.”

- **Stakeholders Engagement**

As stakeholders play a primary role in designing and accepting technical systems, the project team worked toward engaging and consulting the different levels of stakeholders, including public and private organisations, as well as the users’ community of citizens. The governance structure of the project also included every stakeholder group concerned with the census, whether data providers or beneficiaries. Here, the PGM described how the centre had engaged with the stakeholders’ communities:

“We need to be in touch with the community after confirming the accuracy of the data, but the concerned institutions may have particular views of this system and ways to develop it. What concerns us most is the statistical data. Perhaps, we need to communicate with the investment institutions and companies because these data are of interest to them and will serve them a lot.”

The project DBA as well has confirmed the inclusion of the primary stakeholder in the governance structure of the project and their associated roles, stating:

“Nine primary or secondary stakeholder organisations are involved in the project. Every primary organisation has a work team with the following tasks: collecting data, developing mechanisms for data mapping and validation, and supplying corrected data and evaluating its quality.”

5.6.3.4. Attitude and Behaviour

- **Technology Acceptance**

Technology acceptance represents the mindset of adapting to the changes brought up by technological solutions. In e-Census2020, it was reported that unwillingness to share data by some organisations or decision making individuals inside them was one of the challenges encountered during system implementation. The reason behind this depends on the particular situation, which could be political, cultural, technical, or social.

One of the situations, reported by the DGI, was that organisations that did not have adequate technical readiness or had aged staff who follow traditional (i.e., manual)

work procedures, tend to resist the idea of electronic integration to share the data. The DGI described this situation:

“There are many challenges. Firstly, accepting the idea, from some organisations, regarding sharing data electronically... It is complicated. We are facing resistance to change from other organisations that don’t have technical readiness or have aged staff who don’t want to change the traditional way of work.”

It was also found that reluctance to connect can also be caused by poor data quality, such as data inconsistency among the participating organisations. This led to negative behaviour and hindered data integration. The PGM stressed that data discrepancy was an obstacle that must be attended to maintain integration. He said:

“To achieve this connectivity, we find the problem first, such as a discrepancy in data. For example, in the Ministry of Civil Service, the civil number of a person is that of another at the ITA, which causes hindrance and problems. This is one reason why the institutions are reluctant to connect.”

Another factor that discouraged the willingness of organisations to integrate is that some organisations had been uncertain about the integration mechanism and policy, and they were not convinced to connect to the existing ESB central integration hub managed by ITA. The PGM proposed that organisations should work hand in hand with ITA and join the ESB data sharing hub, which imposes certain policies of security and data sharing protocols. He added:

“Other institutions face the challenge of linkage and are not in agreement with its mechanism. We encourage the linkage in the existing ITA system.”

- **Perceived Costs and Benefits**

NCSI staff had been eager to bring the e-Census2020 project to success through anticipating the perceived benefits and convincing other organisations to take part. This would certainly have a positive effect on project implementation, since the outcome of this project does depend on the integration of all participating organisations. In this regard, the PGM explained the different perceived benefits of the project and their implications on government operations and decision making:

“After the construction of the system, we hope that these data will help speed up governmental operations. We are interested in arriving at this stage as a census to make data available and exploit them for other things. Our role is that when the data are complete, we will be beneficiaries and others as well.”

The PGM also highlighted other perceived benefits and cost reduction as a result of e-Census2020 implementation such as process automation, transparency in procedures, as well as the anticipated significant cost reduction in future census projects. He maintained:

“The automation of the processes would facilitate the procedures for people and achieve several things and would result in higher transparency in the procedures. You know the delay in the procedures... This would significantly reduce the cost for us. We expect after this project that subsequent censuses will cost 70 percent less.”

Likewise, the PTM expressed his view regarding data and process integration in the e-Census2020 project, and how such integration would improve security and consolidate the IT infrastructure:

“The project consolidates the data everywhere, let alone minimising fraud, circumvention or impersonation when there is integration. For example, identification when using a civil card in authorisation or fingerprint scanning is enabled by integration as well as other dimensions, such as obtaining various patterns of the traded data patterns.”

- **Perceived Risks**

Perceived risk, which is one of the key potential factors influencing e-Government implementation and its success, was also encountered in the project. The findings revealed that perceived risk was a result of either fear of job reduction, security threats, or data integrity.

Regarding job reduction, there had been a preconception that data sharing normally entails shifting of power and reduction in jobs (or parts of tasks). To fade out this preconception, the issue must be discussed with those particular individuals to explain the implications of data sharing in their jobs and clarify what type of future tasks they will be practising. The PGM uncovered this particular case by saying:

“The second problem is that people are afraid about their jobs in case of sharing the data; they fear becoming redundant, and, in this case, we need to clarify these issues to them.”

Security threats were very common in such an initiative, which in turn discouraged participating organisations from integrating as they tended to keep data locally, however sensitive and confidential, to protect their images. In this respect, one of the security threats perceived in this project by some participating organisations was the fear of data damage or re-identification. This particular situation was described by one of the data analysts as she noted:

“I am currently telling you about the problem of linkage [data sharing] because some organisations say their data are more accurate than those of others, and any linkage would damage their data... and this causes problems between them and us, which may hinder the linkage.”

NCSI officials believed that security threats were unavoidable, but they were certain that different obvious solutions could be applied to protect the data and keep it secure. The PGM, when asked how to cover the security threats issue, replied:

“When we link, there must be a security threat, but this should not stop us. We should think about how to protect data so that no stakeholder would say that it does not want linkage because of the confidentiality and sensitivity of its data. This is the case especially since these data relate mostly to people; for example, the level of education and marital status are not confidential, but they are often required in electronic transactions to finalise any process.”

5.6.4. Analysis of the Effects of the Technological Factors on e-Government Implementation and its Success at NCSI

5.6.4.1. Technological Readiness

- **Technical Capacity**

The technical capacity of knowledgeable human resources plays a vital role in the management and implementation of a huge project like e-Census2020. The centre, particularly the project team, had been facing challenges regarding the scarcity of human resource specialists with different technical expertise, especially in data integration and data analysis disciplines. This issue was raised by the PGM:

“Of course, one of the challenges is the human resources. Specialists in integration and data science are few. There is demand for them not only in Oman but globally. The Sultanate must invest in this significantly.”

The same was confirmed by the PTM, indicating that scarcity of qualified technical resources is a key challenge. The PTM stated:

“We have a scarcity of resources, and most employees are new graduates. They improve themselves and their employers train them in order to develop their technical abilities.”

Another challenge that had been faced regarding technical capacity was the difficulty of retaining the knowledge in the centre for the sustainability of the census process and its associated applications and databases. This difficulty stems from the fact that most of the project technical members were outsourced and they return to their original organisations once the project finishes. The PTM pointed this out and commented:

“We have a training plan from the beginning, and we worked toward attracting Omani skills to build a national capacity and transfer the knowledge from the contracted experts. However, there are challenges to keeping the staff because most of the staff are contract-based as there is no permanent recruitment right now, not to mention that other organisations have a lack of skills. So, there is an issue of knowledge transfer as it’s difficult to keep the knowledge in place. There is a risk of losing the knowledge.”

Lack of technical capacity does also hold for other government organisations participating in e-Census2020. Retaining IT professionals in government organisations had been a major concern. After they get trained and acquire the necessary skills, they move to the private sector for better job opportunities. The PTM, while describing these types of challenges, mentioned:

“... Readiness and weak resources in government agencies. They lack a high level of competence in IT because education and training need a long time to bear fruit. Training needs a great deal of time and those experienced in the government sector move to the private sector. There is large immigration, especially in the field of information technology to get better jobs. We have a scarcity of resources and most employees are new graduates.”

The gap in knowledge and human resources was partially covered by hiring an external consultant firm that had prior experience in similar projects. The consultant created a business case and a project proposal, and later on, assisted in the development of the databases. The PGM described the consultant role:

“Before the start of the project, there was a preliminary study in the light of which we appointed a consultant office. It conducted an analytical study of the project risks, and challenges and expected costs.”

The project team also arranged visits to Estonia for knowledge transfer and to learn from the Estonian experience. Moreover, there also had been an ongoing training programme before and during the project for a group of staff on project management, SAS and data science delivered by specialists in these particular fields, as noted by the PGM:

“Currently, there is a training programme for a group of staff on project management, SAS and data science at the hands of specialists in these subjects.”

- **IT Infrastructure and Interoperability**

Technological readiness also implies adequate system infrastructure and interoperability inside the centre and across all participating organisations. In the centre, the latest technology had been used for database architecture, and all the different systems and architecture components were internally linked and integrated with each other. The PTM described the NCSI systems architecture as follows:

“They have independent systems and cannot go into a single database, because each database has a specific purpose. They all combine in a pool in the form of several databases, such as a questionnaire database and database on household income survey, and others are distributed and independent. There is one data centre but connected so that you can compare or contrast [data].”

With regard to the e-Census2020 project (i.e., at the inter-organisational level), the centre had been working forward to electronically integrate with all participating organisations. This task had been relatively smooth with the organisations that were in good technological readiness such as ROP, MOE and MOHE. This integration was established through the ESB platform hosted in ITA. The PGM maintained:

“Some good institutions completed linkages, including those concerned with education, such as schools (Ministry of Education) or the Ministry of Higher Education. Now, when you inquire by the civil number, it is read from ROP [through electronic link] and this shows the name and the details. Some institutions do not have this and are working on it.”

In this regard, the PTM shared the same view by giving a good example of an organisation with a well-equipped IT infrastructure which was ROP. He stated:

“The Royal Oman Police processes about one million records daily... they are an example in terms of statistics.”

However, not all participating organisations were at the accepted level of technological readiness. For instance, some organisations had been using manual procedures and lacked the needed IT infrastructure and resources to integrate. In this context, a couple of issues were identified, which were highlighted by the PTM when asked about the technological infrastructure challenges. He summarised this as:

“Even the institutions that work on paper do not have databases and systems. They may have systems but no integration platform. The electronic readiness of some government institutions is a challenge.”

To this end, the PMOF further highlighted a key integration issue, which was the heterogeneity of integration infrastructure technologies. He stated:

“The other thing is the availability of integration backbone technology in organisations. So not all organisations have a Webservices infrastructure. Some of them are using database-to-database connections, and these DB-to-DB connections are built on views, and these views are not updated over time.”

Another example is that some organisations were still using a mixture of manual and electronic transactions. The PMOF described this situation by stating:

“Some of the procedures are still manual. Some of the consolidation procedures are still manual, and what I mean by manual is that there’s somebody who needs to run a query and check and make sure everything is OK, and only then sends the file.”

A similar situation was described by the DGI, contending:

“Through the e-Census project, we hope that we make a wider electronic link with other respective organisations. However, there are some organisations which still provide data over email and through magnetic CDs.”

Other types of issues, regarding IT infrastructure and interoperability, in some participating organisations include a lack of internal integration, old technology and legacy systems that are incompatible with modern technology. According to the DGI:

“.. Secondly, available technology, in some organisations, cannot support integration. We, as a new organisation, use the latest technology, while other organisations have old systems and do not use modern technology. Thirdly, some organisations lack internal integration between their departments. So, there is no systematic data flow among departments, and hence, there is an issue when supplying data to outside.”

While there were some organisations whose internal systems were integrated, those may not necessarily have the required capability to integrate with external bodies, as the PGM pointed out:

“Some institutions are ready at the internal level to serve their own operations only. They do not operate outside. Of course, some institutions are fully ready, but they wait for others to be ready. Some others are not ready, do not have complete systems and are currently working on them, while other institutions face the challenge of linkage and are not in agreement with its mechanism.”

The PGM concluded that the electronic inter-organisational linkage had been a persistent issue, and that a completed integration platform was still lacking:

“The challenges we face include the issue of electronic linkage... Yet, we do not have a complete integrated linkage between the institutions so that we read data in the same database.”

On the other hand, the PTM highlighted other types of issues that were related to the build-up of information systems in the participating organisations concerning the structure of data and transactional records. He commented:

“From a statistical perspective, most organisations build their systems on transactional databases. This is a legitimate and presumed right, but the

challenge for statistics is to obtain the data as an aggregate. This database view is absent on their side because they are not interested in statistics.”

5.6.4.2. Data Management

- **Data Quality and Standards**

As indicated by most of the interview participants, lack of electronic data is one of the most important issues that discouraged inter-organisational data sharing and integration. This was due to various reasons such as the manual storage of data records in some organisations, the historical data that existed in very old systems and was difficult to access, or the format or structure of data that lacked acceptable compatibility and standards. The PGM explained an example of this:

“...Of course, the difficulties in linkage included classifications, comprehensiveness and coverage. An example of this is the Ministry of Education. Data are available through the Oman Education Portal, which includes all students studying across the Sultanate's schools. However, there are no data after completing the 12th grade, nor the students who graduated from 10th grade. The portal does not include these data. They only exist as paper files.”

Data accuracy and data ownership were also considered as challenges in this project. Although it had no direct effect in facilitating integration between the centre and the participating organisations, integration could increase data accuracy, given that particular data are read from their original source so that data redundancy and inconsistency could be avoided. The PGM had pointed this out, suggesting:

“We believe that the best solution to the problem of lack of data accuracy is through electronic connectivity that requires each institution that owns particular data items to update and correct them. We read the data from its original source, the Civil Status, and therefore we are working with this organisation on electronic connectivity. The challenge today is the lack of an integrated linkage. Although some institutions have linkages, they lack activation of the link and the data owner is unknown or unspecified.”

The centre had already been electronically linked with some of the participating organisations. However, this integration had been facing various challenges and did not effectively facilitate data sharing for different reasons highlighted by many NCSI

participants. One of the reasons was the lack of enterprise integration (e.g., EAI) where organisations adopted point-to-point integration to provide data to several parties. This approach resulted in data inconsistency and redundancy, and required considerable efforts to alleviate, not to mention the huge volume of data transfers. The centre, however, sought to find a central point of integration (e.g., EAI) so that data are pushed to and pulled from a single place. The PGM expressed this challenge by saying:

“The only challenge today is that every institution has to link several times to provide data to several parties, which doubles the effort of the institution itself. However, when basic data are available in the NCSI, provision thereof shall be from one place.”

Other organisations also adopted ad hoc, and indirect, methods for providing the data, while huge volumes, that were also untimely, had been transferred. The PTM described this type of data transfer and the challenges that the centre had been facing:

“When we ask for aggregate data, they may be modified manually, but when we ask for raw data, we may get huge quantities of data that are potentially modified at the same time. We aspire to direct integration with the institutions to receive live data in the form of database views. In this case, it shall not be necessary to enter [i.e., login] into their systems and start drawing the requested data.”

Another reason was that the data collected from the various organisations were not of acceptable quality because there was no agreed data structure (or standard data definition) across government organisations. Each organisation had its own method of data classification. This resulted in inaccurate statistics. The PMOF raised this concern and commented:

“Well, first, one of the major challenges in the integration between government organisations is the unification of classification. For example, the job titles are not unified. So, if you want to integrate the employees’ records, they have different job titles. So, there is no unified job title repository that is applied across all government organisations. And you can apply this concept of classification across all government activities. This is a major road blocker.”

This problem was spread across government organisations, and the centre had been facing a major challenge indeed. It had been very costly and overwhelming to overcome this issue. The PMOF suggested that human resource (HR) systems in government organisations should be re-engineered to adopt a unified data classification. However, such a task may take several years to get done. This had potentially impacted statistical reporting, as he explained:

“We are trying to bring this in our reporting and statistical studies. We cannot bring them in because we have to re-engineer this whole system and re-engineer the whole salary structure, and this is really hard. In fact, this needs years of work because salaries and grades are linked to the [job] titles. It is supposed to be, but in Oman it is not linked to the [job] titles. The grade is one thing and the [job] title is a different thing. Your grade is set based on salary compensation, but your title is a completely different island. They are not linked together. And this creates a huge block to adopting a unified system for HR and salaries.”

The other thing is that some government organisations do not keep a central log for their daily transactions and thus their data logs (that could be used for statistical summaries) existed in different database locations and lacked internal integration. The PMOF described this issue by adding:

“Some government organisations still don’t have unified registers for their activities. So, you see the activities scattered across different systems and databases. For example, one of the ministries has the old data in one system and the new data in a different system. It’s not brought together into one database... it should be one register, that people feed into this register and this register stays up to date.”

- **Data Security and Privacy**

In terms of data security and privacy, NCSI had well dealt with this important matter. However, this had been a persistent concern with the centre’s officials. In this regard, the PGM identified cases of different data security and privacy threats by saying:

“Of course, there are always two sides to everything, one positive and one negative. When we link, there must be a security threat, but this should not stop us. We should think about how to protect data so that no stakeholder would say

that they do not want linkage because of the confidentiality and sensitivity of their data.”

To maintain privacy, all collected data was subject to an anonymisation process and no access was allowed at or below records level. The PGM elaborated on this matter and confirmed:

“Of course, as a statistical entity, we work later on data anonymisation so that the team of statisticians only access statistical data for statistical analysis, rather than the personal or individual data. This means that we publish only statistical data electronically through the system.”

In the same respect, one of the data analysts described that conforming to the governance and legal regulations of the project helped to maintain secure and confidential access to the data:

“Commitment to the information security regulations and rules followed in the project, and not to access personal data of individuals.”

When questioned about the security provided through the enterprise infrastructure (i.e., ESB) which is supervised and maintained by ITA, the PGM appreciated the role played by ITA in securing data transfer and transactions through providing the needed infrastructure and tools. He elaborated:

“True. I think they have a strong team on this side, and we hope we can cover this aspect.”

5.7. Comparative Analysis of the Significance of the Socio-Technical Factors on e-Government Implementation and its Success

This section summarises the findings from the three case studies described above to demonstrate the comparative significance of the socio-technical factors affecting e-Government implantation and its success.

Although this chapter aimed to present case by case data and analyse the dimensions that were considered in the framework, an initial understanding has also emerged in terms of what was experienced and how the picture of different circumstances has led and directed the projects. This section starts by providing a comparative contextual view of the three case studies to note the contextual

difference in terms of organisational settings. It then proceeds to offer a collective combinatory comparison of factors' significance, and that some factors may be more important for some organisations than others.

At the cross-case level, the analysis process of the three case organisations (i.e., MOMP, MOCI, NCSI) demonstrated in this exploratory study revealed various contextual similarities and differences. The three case organisations shared some common characteristics. They are all Omani public organisations under the central administration of the Oman government. However, NCSI has been newly established with its own (modern) policies and legislations that have been adapted to the requirements of e-Government transformation, such as data privacy and resource sharing regulations. In general, the goals sought from initiating the three projects (i.e., AMMS, InvestEasy, e-Census2020) were almost common, aiming to achieve the vision of the e-Oman transformation plan and Oman 2040 strategy and to foster the socio-economic development of the country. These projects had been developed by a single vendor who followed the same project management and governance methods. This could have helped to establish unified standards across the three projects. From a financial perspective, the three projects were initiatives of the national e-Oman transformation strategy sponsored by the Cabinet. Therefore, there was no major issue in funding the projects' core tasks, despite the financial crisis and the delay encountered in launching them. Thus, the three projects had been aligned with each other and linked electronically with the Omani national infrastructure of the OGN computer network and the ESB data exchange hub, plus other key platforms including the PKI electronic signature platform and the e-Payment gateway. This helped to control and monitor the projects and speed up their implementation. Moreover, the projects shared common stakeholder organisations.

On the other hand, the three case organisations have different businesses and serve diverse beneficiary needs. Thus, the three projects have different missions and objectives. The AMMS project serves the labour sector, InvestEasy is associated with business investment, and e-Census2020 was meant for statistical planning to monitor the demographic growth and change in the public census, housing, and establishments.

At the factor level, the outcome of the analysis process in this research showed that the effects of the identified socio-technical factors, including the dimensional sets of environmental, organisational, and technological, were proven to be highly influential and important in the implementation of e-Government projects and their success.

The environmental set of factors is perceived from the environment in which the technical solution operates. In particular, the factors associated with government mandates was the most influential of all. They were the primary driving force towards initiating the projects and completing them on time. The effects of this set of factors are described below in further detail.

The **pressure forces** of *institutional Isomorphism* were highly significant in mandating the e-Government transformation and acted as a primary driving force towards initiating the projects and completing them on time, through the pressure of the key mandates of e-Oman strategy, the Cabinet, and the citizens' demands for service improvement and performance, supported by the availability of adequate ICT infrastructures such as the Internet and the mobile technology advancements. These forces were the most influential of all, as they enabled timely and rapid delivery of e-Services, leading e-Government implementation projects to success. This significant effect could be explained by correlating the government structure which is a single level (i.e., central administration) with the tight control of monitoring the progress at the top level.

Media and the public were very influential in the initiation and execution of the e-Government implementation projects. For example, they impacted the strategy of service planning and sustainability at MOMP and overwhelmingly raised the ceiling of expectations of the citizens at MOCI. However, in the case of NCSI, this sub-factor had low or no effect.

It was also observed that *economic conditions* had moderate effects on the overall execution and success of the e-Government implementation projects, by which the supporting activities were mainly affected by the budget cuts by the government. Budget cutting also impacted data sharing and integration amongst government organisations, caused delays in starting the AMMS project at MOMP and slowed down the rhythm of the e-Census2020 project at NSCI. In this respect, the direct

effect of the budget cuts was mitigated by adopting alternative solutions and finding other sources of funding, for instance, allocating part of annual revenues to the respective organisations to the projects. Another way was to invite private sector organisations to sponsor the projects by means of public-private partnership investments.

Policies and legislations, including *institutional legitimacy* and *regulatory frameworks*, were not significant in influencing e-Government implementation and its success. Although policies and legislations for e-Government were lacking at the national and cross-organisation levels, government mandates and statutory authorities of ITA acted as informal legitimacy that helped in facilitating data and resource sharing among government organisations.

The organisational dimension of factors that stem from inside or across organisations includes managerial issues, structure, and the culture of the organisation, facilitating conditions, and attitudes and behaviours. This set of factors and sub-factors was found to be significantly influential, as through them e-Government implementation was either facilitated or inhibited.

In this respect, it was found that **managerial capability** of *leadership and support*, and *strategic planning* had been reinforced by government higher authorities such as the Cabinet. This had supported and empowered project leaders and implementation teams at the various levels in a way that facilitated the execution of the e-Government implementation projects. However, the aspect of change management, particularly in the MOCI case, was perceived as inefficient. As a result, a few political conflicts and cultural issues between the key decision makers exacerbated the transformation process. The adaptation of the InvestEasy system to the new practice within the business context, inside the organisation and amongst the stakeholders of the project, was very slow.

Aspects related to the **organisational structure and culture**, such as organisational structure, organisational culture, organisational politics, and motivations and incentives, were mostly perceived as barriers to a smooth e-Government transformation.

In *organisational structure*, functional silos and focus on own priorities were present in most of the government organisations regardless of the importance of the e-Government projects under study. This impacted data sharing and electronic integration efforts, as in the case of MOMP integration with MOH. In addition, it was noticed in this study that the bureaucratic organisational hierarchies impacted the decision making process, which resulted in slow technological transformation. This issue could be linked to the ineffective change management process discussed above.

Regarding *organisational culture*, it was found that some organisations had been sticking to their old procedures, especially those with low technological readiness and/or in the early stages of e-Government transformation. Old mindsets of staff were an obstacle when shifting from the traditional mode to the new electronic mode implied by the technical solutions. Also, data sharing and integration culture were not compromised as a normative practice, leading to systems failure or delay in data sharing and electronic integration across organisations.

Organisational politics, as well, were a barrier in the implementation pathway. For example, in MOMP the influence of key decision makers such as middle managers had impacted the project communication plan, putting a greater burden on the project manager and slowing down project execution. Moreover, some organisations wanted to keep their systems live and tended to retain their data internally, unwilling to share data. Such situations resulted in duplication of systems and resources with a high cost to maintaining and synchronising information systems across government organisations.

The evidence for *business processes* influencing e-Government implementation was mixed in this study. For example, in the case of MOMP, it was indicated that an increased level of internal efficiency was gained as a result of BPR. Moreover, it was reported that inter-organisational integration and data sharing had improved, although a maturity level of data sharing had not yet been achieved. In contrast, in MOCI, conflicts of tasks among the organisations because of incorrect process management had persisted, while in NCSI, BPR required exceptional efforts and entailed drastic changes and extra cost for data providers' processes, which also impacted their information systems.

The weakest link among the structure and culture sub-factors was *motivations and incentives*. The findings revealed the unfortunate absence of monetary rewards and incentives, particularly in the cases of MOMP and MOCI, less so in NCSI since the majority of the e-Census2020 project staff were contracted. A possible reason for the lack of such an aspect could be the deficiency in the government budget and the consequent cuts in project funding. As a result, a high turnover of specialised IT professionals from the government sector was noted.

The effect of **facilitating conditions** was found to be positively influential and supportive of e-Government implementation and its success. The findings indicated that facilitating conditions of inter-organisational *networking* and *trust* had positively contributed to the success of the implementation, and the achievement of a great deal of electronic integration among the participating stakeholder organisations.

Most of the participants in the three case organisations argued that inter-organisational *networking* such as socialisation and interaction with stakeholders had strengthened inter-organisational relationships, which resulted in fostering future collaborations, and increased response and trust. Moreover, the role of ITA in providing national IT infrastructure, and the sponsorship of the Cabinet, had also reinforced inter-organisational collaboration and enabled the effective use of multiple communications channels to diffuse awareness to citizens. These together helped to establish the electronic connections and feed in information system databases with the needed data. This had eventually aided a faster delivery of e-Government services.

Trust among stakeholders was perceived as being advantageous to e-Government implementation across the three case organisations. This key factor addresses the strength of the relationships between the stakeholders involved in the implementation. The study results indicated that socialisation and interaction with stakeholders, alongside the governance structure of the three projects, which included senior committees of top executives, had strengthened the trust among the participating organisations, resulting in fostering inter-organisational collaborations and increasing the response to the different requests for resources.

The *governance* structure of the three projects of the respective case organisations maintained *stakeholder engagement* as a fundamental element of the project governance framework (OeGF) introduced by ITA. Therefore, the projects environment had been very supportive of the active participation of the different stakeholder groups, which resulted in service improvement. However, late engagement of some of the key stakeholders in the case of the InvestEasy project at MOCI stimulated negative attitudes and impacted users' acceptance, because they felt that they were ignored, and their opinions were not carefully considered.

Drawing from the three case studies, it was found that the factor of **attitude and behaviour**, to some extent, had negatively affected the implementation in the three respective projects. The findings of the interviews revealed different variations of this factor in the forms of individuals' or groups' reactions inside the participating organisations. The extent of the effect of this key factor, as perceived by the participants, is presented below through the three relevant sub-factors.

Technology acceptance in this category presented the most influential sub-factor among the others across the three case organisations. At the inter-organisational level, unwillingness to establish electronic connections or to share data presented in the three respective projects resulted in delaying the implementation in the case of MOMP and affected data validity and quality in the case of NCSI. At the individual level, there was resistance to change from the staff for various reasons. In particular situations, this resulted in promoting negative propaganda about the project to the investors, as in the case of MOCI. The reasons reported, from the three cases, for such behaviours were cultural (e.g., old mindsets of work procedures), technical (e.g., lack of technical knowledge or low technology readiness), political (e.g., a shift of role or power), or social (e.g., lack of early staff engagement, as discussed above).

Regarding *perceived costs and benefits*, the stakeholders in the three projects were able to realise the advantage of the implementation and its impact on society. The effects of perceived costs and benefits in the three projects were revealed by the participants in the three case organisations. This included various implications such as cost cutting, return on investment, operational efficiency, improvement in data quality, inter-organisational knowledge transfer, and money savings, however in

the MOCI InvestEasy system. As a result, it was reported that organisations' willingness to share data and exchange resources had increased. Moreover, the users' intentions to use the services had steadily grown.

Similarly, the same was observed regarding *perceived risks*. The risk was mainly perceived in the fear of the old/aged system failures and also upon receiving the data that was over-modified, re-identified or incompatible with the organisations information systems. Additionally, it was also noted in the case of MOMP that the citizens' use of the AMMS self-services, which had been newly launched, was associated with a risk that was perceived in the caution of transaction failure or unacceptability/incompleteness of the application requests. As a result, a large number of citizens still preferred to apply to the respective services through private service brokers as they used to do before the launching of the self-services.

The technological dimension of factors that relates to organisational preparedness in information technology as well as data management, quality and security perspectives were also found to be very influential in enabling e-Government implementation and streamlining its operations. The effects of these factors and sub-factors are demonstrated below.

Technological readiness was found to be challenging where many public organisations lacked good IT infrastructure and skilled personnel, which negatively affected electronic integrations and data sharing across government units.

The study results showed that *technical capacity* was a very pressing issue. It was observed that the three respective projects suffered from the scarcity of HR specialists in IT in general, and in electronic integration and data analysis specialisations in particular. This issue resulted in a wide skills gap that could not easily be covered except through hiring an international vendor company that had prior expertise in similar projects. The vendor, to a large extent, was capable of carrying out the technical development.

Regarding *IT infrastructure and interoperability*, the findings indicated that the three case organisations had the adequate hardware equipment and software tools needed to engage in the projects, given the availability of the supportive national IT infrastructure deployed by ITA. However, e-Government IT infrastructure requires an extended view of the enterprise that spans multiple organisations and

connects the various parts of the government involved in providing the service (Dawes, 2009). The result of the data analysis in this study indicated that the main concern regarding IT infrastructure and interoperability was relating to the other participating organisations that were involved in the projects, either for providing data or integrating their information systems into the enterprise systems being developed in the three projects. The three projects suffered from a lack of IT infrastructure and electronic information systems in some participating organisations. This had delayed the implementation on some occasions, as the case organisations were forced to wait until other parties got ready. On other occasions, the case organisations followed alternative methods to acquiring the data such as offline data loading, or even the development of software applications, especially to encapsulate the remote processes of other parties. This resulted in spending extra efforts and resources and caused further delays in the projects.

Except for the case of NCSI, **data management** had not been a major concern for MOMP and MOCI. Therefore, in the case of NCSI, the data management factor was significantly influential, as the success of the e-Census2020 project critically depended on the availability of quality electronic data received from the public and private organisations.

Regarding *data quality and standards*, a lack of data quality and standardisations across the three case organisations was noted. In the case of NCSI, issues of data incompatibility and poor data quality were reported. Moreover, some data were unavailable in electronic format and/or were hard to access, which potentially impacted the statistical reporting. Thus, data standardisation was a major issue at NCSI that resulted in a huge data correction and cleansing process.

On the other hand, there was no major issue concerning *data security and privacy*, and thus there was no particular security concern in the respective systems because of the high security standard devoted to the ESB data hub solution adopted in ITA, which helped in tackling most of the data security and privacy issues. The ESB is protected by multiple levels of network security configurations as part of the national government network (OGN). Moreover, data access roles and restrictions could have been imposed on the organisation level. Most of the participants in the three case organisations indicated that security and privacy were guaranteed

through ESB data exchange and transactions flow. It was noted that ESB was enforced by centralised role-based security with anonymisation and encryption mechanisms, which enhanced inter-organisational data security and diffused trust, facilitating a successful implementation. The comparative significance of the effects of the socio-technical factors is summarised in Table 5.6.

Factor	Sub-Factor	Effect Type (Negative/Positive)	Degree of Significance (Low/Moderate/High)
Pressure Forces	Institutional Isomorphism	Positive	High
	Media and the Public	Positive	Moderate
	Economic Conditions	Negative	Moderate
Policies and Legislations	Institutional Legitimacy	Negative	Low
	Regulatory Frameworks	Negative	Low
Managerial Capability	Leadership and Support	Positive	Moderate
	Strategic Planning	Positive	High
Structure and Culture	Organisational Structure	Negative	High
	Organisational Culture	Negative	High
	Organisational Politics	Negative	High
	Business Processes	Positive	Moderate
	Governance and Operations	Positive	High
	Motivations and Incentives	Negative	High
Facilitating Conditions	Networking	Positive	High
	Trust	Positive	Moderate
	Stakeholders Engagement	Positive	Moderate
Attitude and Behaviour	Technology Acceptance	Negative	Moderate
	Perceived Costs and Benefits	Positive	High
	Perceived Risks	Negative	Moderate
Technological Readiness	Technical Capacity	Negative	Moderate
	IT Infrastructure and Interoperability	Negative	Moderate
Data Management	Data Quality and standards	Negative	Low
	Data Security and Privacy	Positive	High

Table 5.6: Degree of Factor's Significance affecting the Success of e-Government Implementation in Oman

Further examination and in-depth analysis of these factors will be undertaken in the next chapter (Chapter 6). Analysis of the interactions of these factors will be further extended, where the analysis will lead to more combinatory outcomes. This will be

presented as propositions to contribute to the existing knowledge of e-Government and be used for the purpose of future research in the field.

5.8. Summary

This chapter has presented the analysis and findings of the within-case analysis of the three case organisations that were identified based on the selection criteria described in the previous chapter (Chapter 4). The data analysis process was formulated by connecting the field inquiry to the research question and the objectives of the study, and the dimensions and key factors and sub-factors of the conceptual framework. The chapter has also offered cross-case and cross-factor analyses in order to identify similarities and differences in the issues related to the effects of socio-technical factors on e-Government implementation and its success across the three case organisations.

Based on the finding of this chapter, the next chapter takes the analysis further by analysing the interactions of the socio-technical factors to understand the outcome of the interactions and its implications for the e-Government implementation and its success.

CHAPTER 6: Analysis of Socio-Technical Interactions and their Implications for e-Government Implementation and its Success

6.1. Introduction

Data collected through interviews and documents from the three case organisations were analysed, and the outcomes were presented in Chapter 5. The narrative of the findings was organised according to the dimensions, factors and sub-factors of the conceptual framework developed earlier in the thesis. This chapter draws on socio-technical theory to analyse the interactions of the social-technical factors to understand the implications of these interactions for e-Government implementation and its success. It also engages the interaction outcomes with the relevant literature presented in Chapters 2 and 3 to develop a solid and comprehensive understanding of the implications. These implications are conveyed as theoretical propositions for future research.

The chapter is divided into three sections, including this introduction. Based on the results of the case study findings, Section 6.2 offers an in-depth analysis of the interactions of the socio-technical factors to understand the ways in which the social and technical factors interact and affect each other and the implications for the implementation of e-Government and its success. Moreover, this section discusses the resultant socio-technical interactions with the relevant theories and prior literature to interpret the results and develop theoretical propositions based on them. The key purpose of this attempt is to contribute to the existing knowledge of e-Government and to establish an agenda for future research in the field. Lastly, Section 6.3 summarises the chapter.

6.2. Analysis and Implications of Socio-Technical Interactions and Proposition Building

This section presents the analyses and discussion of the interactions of the socio-technical factors and their implications for the implementation of e-Government and its success. Following the same coding theme presented in Sub-section 4.5.3.2, these factors have been grouped into three dimensions—environmental, organisational and technological—and each set of dimension has been classified as the main factors and

sub-factors, as delineated by the conceptual framework of this research. Therefore, the outcome of the analysis of the interviews presented in Chapter 5 revealed various (causal) inter-relationships (i.e., interactions) among many factors. For example, ‘trust’ influences ‘technology acceptance’. Based on observing these relationships and the results to which they lead, we draw conclusions and implications for e-Government implementation and success. Thus, direct and indirect effects were captured and elicited to understand and examine the interactions among the socio-technical factors. Therefore, the analysis process of socio-technical interactions in this study was initially developed by capturing the various effects identified during the data analysis and synthesis stages (i.e., direct effects). Then, the relevant factors involved in such effects were identified and mapped diagrammatically to highlight the implications (i.e., indirect effects), as shown in Figures 6.2–6.7. It should be noted, however, that the number of interactions and effects are not exhaustive. The researcher attempted here to analyse the interactions that led to significant implications, as interpreted by him. Thus, the researcher adopted (with modification) the model of Faerman et al. (2001) – introduced previously in Figure 4.3 - to visually present the interactions of the socio-technical factors.

Drawing on Faerman et al.’s (2001) model, the main and sub-factors in this study are represented in square boxes. The oval shapes represent the interaction relationships between the respective factors, while the arrows show the flow and direction of the influence. The end state/result of the interaction is symbolised as a double-lined rectangle to represent the implication of the consequent effect. However, the occurrence of the interaction does not represent specific timelines, as in Faerman et al.’s model, but rather exemplifies particular scenarios and situations as revealed by the data collected from the undertaken field studies. Given that the study took a retrospective view of the implementation process (hence the outcomes and success/failure), as a modification in the adopted model (Faerman et al., 2001), timelines were omitted in this research.

In effect, the empirical findings in this research revealed six different (significant) implications drawn from the analysis of socio-technical factors interactions. The factors involved in these interactions and their consequent effects are summarised in Table 6.1. Their detailed descriptions are discussed in the following sub-sections. The

sets of interactions are listed and ordered according to their occurrence and interpretation during the data analysis.

No.	Factors/Sub-Factors Involved	Number of Interactions	Implications (areas of projects impacted)
1	Economic Conditions, Governance and Operations, Motivations and Incentives, Technical Capacity, IT Infrastructure and Interoperability.	5	Difficulties in achieving electronic integration and data sharing
2	Media and the Public, Institutional Isomorphism, Leadership and Support.	2	Projects' timely initiation and fast delivery of e-Services
3	Governance and Operations, Leadership and Support, Institutional Legitimacy.	2	Informal attainment of institutional legitimacy
4	Leadership and Support, Organisational Structure, Stakeholders Engagement, Technology Acceptance, Technological Readiness, Organisational Culture, Organisational Politics.	6	Slow e-Government transformation
5	Trust, Data Quality and Standards, Technological Readiness, Technology Acceptance, Data Security and Privacy, Networking, Perceived Costs and Benefits	8	Successful e-Service or system implementation
6	Data Security and Privacy, Data Quality and Standards, Perceived Risks, IT Infrastructure and Interoperability, Trust, Technology Acceptance	5	e-Service or system failure

Table 6.1: Summary of Socio-Technical Factors Interactions and their Implications

Drawing on the implications list in Table 6.1, the researcher suggests that these implications can lead to theoretical propositions that contribute to the existing knowledge of e-Government and can be used for both practical purposes and future research in the field. This approach is built on two key reasons: the first is that this study is exploratory in nature, finding new angles for understanding e-Government projects' success; and the second is that, as explored in the review of the existing literature and the current gaps, the implications of the socio-technical interactions in implementing e-Government have not been empirically validated.

6.2.1. Proposition 1: Adverse effects of key factors on the successful technical integration of e-Government

The construction of factor interactions (direct effects) and the resultant consequences (indirect effects) leading to Proposition 1 is explained in Table 6.2 and represented

visually in Figure 6.1. This interaction involved five factors: economic conditions, governance and operations, motivations and incentives, technical capacity and IT infrastructure and interoperability.

Empirical Evidence Examples	Direct Effects/Factors Interactions	Indirect Effects/Implication
<i>“Currently budget doesn’t support... paid training, bonuses and new employments have been suspended.”</i>	Government budget (<i>economic conditions</i>) affected training and employment (<i>governance and operations</i>), and bonuses (<i>motivations and incentives</i>)	Difficulties in achieving electronic integration and data sharing
<i>“Data sharing or process integration ... implies high cost and requires allocation of budgets which is difficult, especially in the current financial crisis.”</i>	Financial crisis (<i>economic conditions</i>) affected budget allocation (<i>governance and operations</i>)	
<i>“There have been no monetary rewards. This could be because of the shortage of the national budget.”</i>	Government budget (<i>economic conditions</i>) affected monetary rewards (<i>motivations and incentives</i>).	
<i>“... the experienced in the government sector move to the private sector. There is a large immigration, especially in the field of information technology to get better jobs. We have a scarcity of resources, and most employees are new graduates.”</i>	Low payments (<i>motivation and incentives</i>) affected the availability of experienced technical staff/resources (<i>technical capacity</i>) in the government sector.	
<i>“... some government organisations still cannot deal with Webservices.”</i>	Lack of technical resources (<i>technical capacity</i>) affected systems readiness (<i>IT infrastructure and interoperability</i>).	
<i>“...their system does not have the required compatibility (or readiness) to integrate with our system.”</i>		

Table 6.2: Factors Interactions Leading to Proposition 1

As shown in Figure 6.1, the government budget (economic conditions) devoted to public organisations was cut due to the global economic conditions affecting the country as a result of a sudden decrease in income from oil exports and other related effects. This led to budget cuts and delays in access to funds from the central government, which consequently forced the three public organisations under investigation to regulate their spending on the three e-Government implementation projects. As a consequence, the three organisations focused their spending on the core project tasks that affected project supporting operations, such as recruitment (governance and operations), as well as motivations and incentives. While recruitment was ceased, monetary incentives were disregarded, which also made IT personnel move to the private sector. Such a scenario resulted in a lack of skilled IT personnel (IT capacity) who have the ability to develop software applications, such as Webservices, needed to establish electronic connections and data access and sharing among organisations. In turn, this affected the IT infrastructure (IT infrastructure and interoperability) of the organisations and constrained access to the data sources.

Therefore, the implication of such interactions was the difficulties in achieving electronic integration and data sharing among the participating organisations.

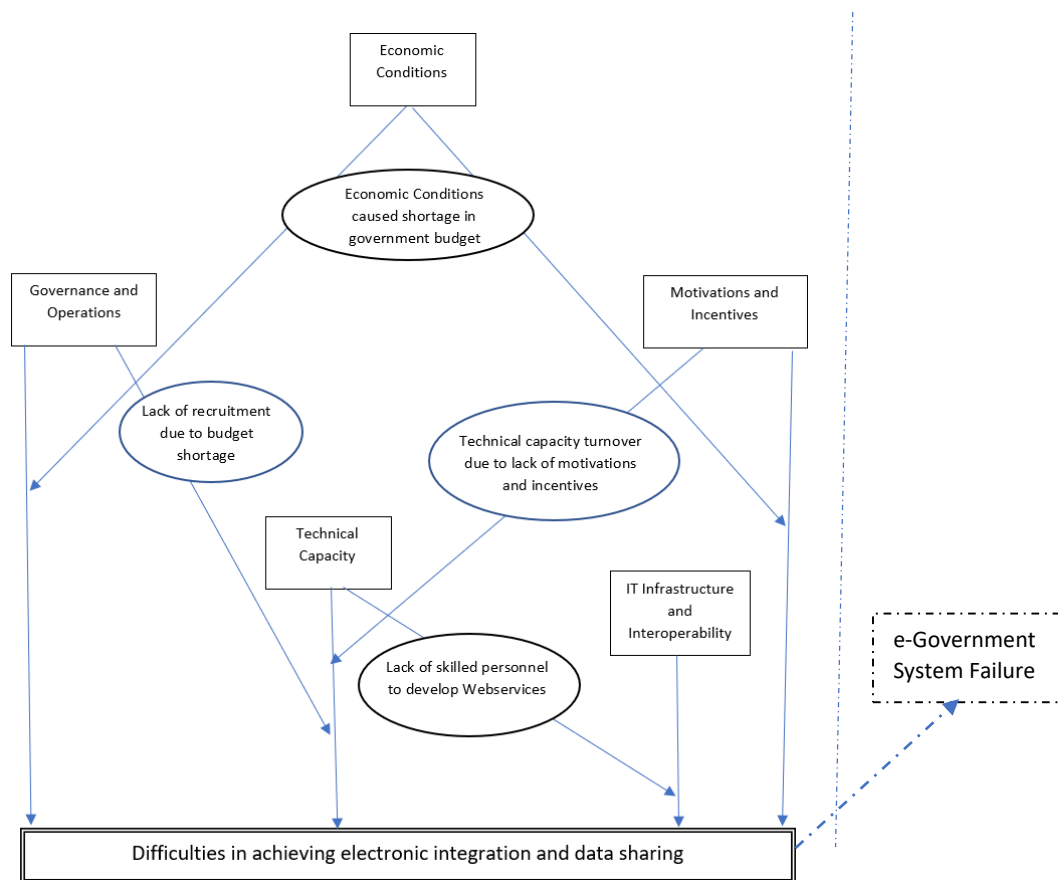


Figure 6.1: Factors Interactions Leading to Proposition 1

This finding agrees to a certain extent with the results of Bigdeli et al. (2013) and Glyptis et al. (2020). Bigdeli et al. (2013) indicated that, due to a financial crisis, the central government in the UK had planned to significantly reduce the current budget, which, in a way, resulted in the reduction of the annual budgets of the LGAs. Similarly, Glyptis et al. (2020) found that the financial stand of Cyprus and the surrounding economic conditions influenced e-Government implementation in the country. The government in Cyprus imposed financial restrictions to regulate the funding of e-Government projects. In accordance with this, Scholl and Klischewski (2007) noted that limited budget constraints might impact integration and interoperation efforts between organisations, since such efforts require the sustainability of operations and thus ongoing funding. This result is also consistent with that of Yang and Wu (2014), who observed that there were limited or no incentives devoted to data provider organisations because most organisations were usually under constrained budgets, resources and personnel. Yang and Wu’s (2014) study suggested that the limited

incentives were not worth the data sharing efforts of government employees. However, according to TCE theory, incentives can play an important role in e-Government implementation (Pardo & Tayi, 2007). The extant literature indicated that incentives are a key factor in motivating data sharing behaviour (Pardo & Tayi, 2007; Yang & Wu, 2014). Most importantly, STS design principles, as identified by some STS scholars (e.g., Bostrom & Heinen, 1977a; Cherns, 1976; Clegg, 2000; Eason, 2014; Mumford, 2006), outlined that workers' rights and needs should be reserved and must be regarded as those of the non-human parts of the work system. For this reason, the following proposition is posited:

Proposition 1: Technical aspects of e-Government, particularly the establishment of electronic integration and data sharing of e-Government data/information, can be severely impacted by unforeseen changes in the general environment of the project, such as economic crises and consequent budget constraints.

6.2.2. Proposition 2: A positive outcome for pressure forces aspects of e-Government

The construction of factor interactions (direct effects) and the resultant consequences (indirect effects) leading to Proposition 2 is explained in Table 6.3 and represented visually in Figure 6.2. This interaction involved three factors: the media and the public, institutional isomorphism, and leadership and support.

Empirical Evidence Examples	Direct Effects/Factors Interactions	Indirect Effects/Implication
<p><i>"The transfer to e-Government services... there was external pressure from the Cabinet. The directions of His Majesty, Sultan Qaboos motivated us to do the project as part of e-Oman strategic plan."</i></p> <p><i>"External and internal pressures were from the Cabinet and the Minister of MOCI, who mandated the project to finish in two years."</i></p> <p><i>"The change has been influenced by a strong internal desire."</i></p>	<p>External and internal pressures (<i>institutional isomorphism</i>) influenced the management (<i>leadership and support</i>) to initiate the project and expedite its execution.</p>	<p>Timely project initiation and fast delivery of e-Services</p>
<p><i>"... There was high pressure from the stakeholders for improving ministry's services."</i></p> <p><i>"... The key external pressure was the complex process of starting a business in Oman, and there was dissatisfaction from the investors, which has high influence."</i></p> <p><i>"... We notice increasing demands on new data and its details. Therefore, this had motivated us to adopt information technology to implement electronic online solutions."</i></p>	<p><i>The media and the public</i> influenced the management (<i>leadership and support</i>) to improve public services.</p>	

Table 6.3: Factors Interactions Leading to Proposition 2

The projects under study were mainly driven by the environmental pressure forces of institutional isomorphism and partly by the media and public. While the first created the pressure of strong mandates over the leadership (leadership and support) of the three organisations, the second, as a result of the media awareness campaigns held by organisations (e.g., the case of MOCI), raised the expectations of the public in getting innovated electronic services. Both types of pressures implied project initiatives and the delivery of timely modern e-Services. The implication of such interaction was that the timely initiation of projects and fast delivery of e-Services were achieved.

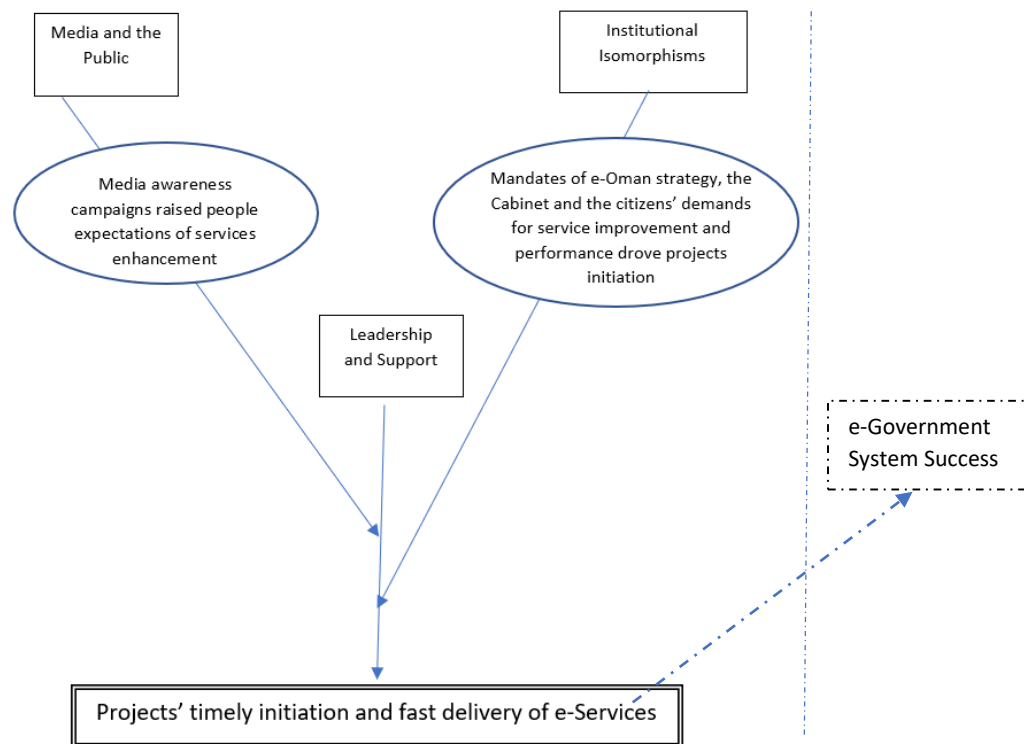


Figure 6.2: Factors Interactions Leading to Proposition 2

This outcome is in line with Yang and Wu’s (2014, 2016) and Tangi et al.’s (2020) findings. Yang and Wu (2014, 2016) indicated that pressures from higher-level authorities, the media and the public can influence government agencies to gradually share open data. However, Tangi et al. (2020) results demonstrated that external drivers (e.g., external pressure, such as pressure from external stakeholders or legal obligations) are the primary driving forces of the fast delivery of e-Government services. This also agrees with the results of other researchers who have reported the positive impacts of institutional isomorphism forces on e-Government implementation (e.g., Fountain, 2001; Gil-Garcia & Flores-Zúñiga, 2020; Luna-Reyes & Gil-Garcia, 2011). Therefore, the following proposition can be deduced:

Proposition 2: Pressure forces, particularly from higher authority mandates and the public (largely via media), can work as strong drivers in e-Government project initiatives to prompt timely initiation of projects and fast delivery of e-Services/e-Government systems.

6.2.3. Proposition 3: Leadership and agency effects of e-Government executives on projects’ legitimacy

The construction of factor interactions (direct effects) and the resultant consequences (indirect effects) leading to Proposition 3 is explained in Table 6.4 and represented visually in Figure 6.3.

Empirical Evidence Examples	Direct Effects/Factors Interactions	Indirect Effects/Implication
<p>“... Cabinet decision – contains the principles of the project as national project like integration of systems (process and data), project vision – approved by cabinet and shared with steering committee –includes the main themes of the project like transparency and integration of data and process, and support of steering committee.”</p>	<p>Governance structure of the projects (governance and operations) with Cabinet decisions and the top executives from the participating organisations (leadership and support) informally influenced the sharing of resources (institutional legitimacy) across government organisations, despite lack of national-level legitimacy that governs resource sharing in the e-Government projects.</p>	<p>Informal attainment of institutional legitimacy</p>
<p>“Financial requests go through the senior committee, and from there, the Minister then communicates with Ministry of Finance, whereas the culture of sharing or exchange of human resources among organisations does not exist here in Oman.”</p>		
<p>“One steering committee includes undersecretaries from the various government stakeholders. The other one includes the ministers and CEO of ITA. The project is part of e-transformation strategy initiatives.”</p>		

Table 6.4: Factors Interactions Leading to Proposition 3

A lack of institutional legitimacy was observed in two of the case organisations, MOMP and MOCI. However, governance structure of the two projects (governance and operations) contained top executives from the participating stakeholder organisations. Government mandates from the statutory authorities, such as the Cabinet (leadership and support), were perceived as legitimates. Both powerful forces collectively influenced institutional legitimacy towards acquiring and sharing data and resources across the participating organisations.

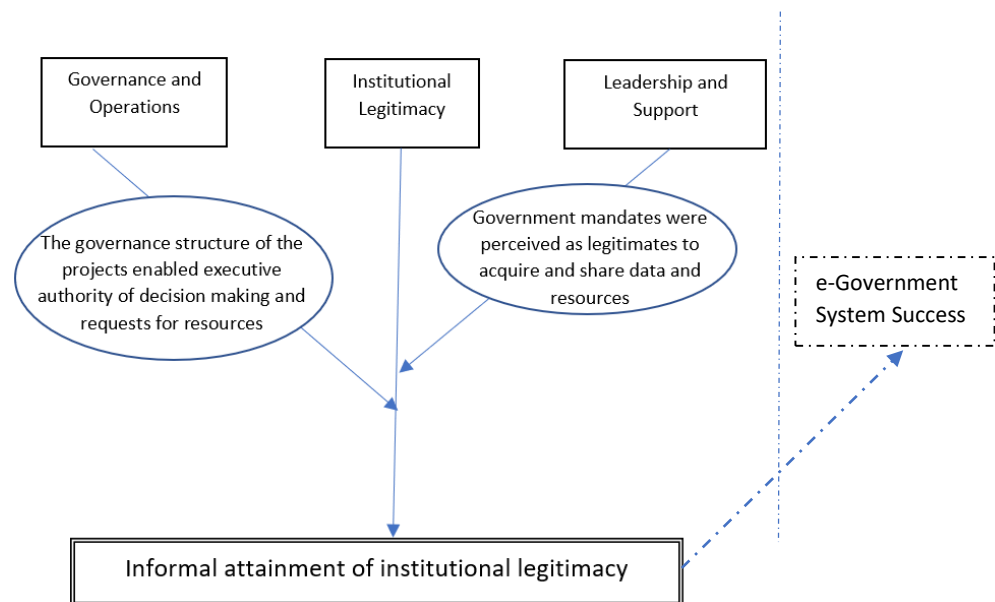


Figure 6.3: Factors Interactions Leading to Proposition 3

Thus, the implication of the above interactions was the informal attainment of institutional legitimacy across the respective organisations. This is consistent with prior literature that indicated gaining informal institutional legitimacy through the involvement of top executives (Dawes et al., 2009; Gil-Garcia & Sigit, 2016; Yang & Maxwell, 2011). This empirical finding also provides further support for prior research on the impact of leadership and support, in which many researchers have reported that leadership is one of the most significant factors influencing e-Government implementation initiatives (e.g., Bigdeli et al., 2013; Gil-Garcia et al., 2010; Glyptis et al., 2020; Kamal et al., 2015; Nograšek & Vintar, 2014; Pardo et al., 2012). For example, Dawes’s (1996) highlighted that top management support has consistently been found to play a major role in facilitating the implementation of ICT solutions in the inter-organisational context, while Yang and Wu’s (2014) confirmed that the authority involvement of statutory organisations and top executives is influential in inter-organisational data sharing initiatives. Consequently, the following proposition is suggested:

Proposition 3: In the absence of a proper institutional setting, the role of top executives can be critical in obtaining informal legitimacy to access and mobilise the necessary data and other resources to facilitate the success of e-Government implementation.

6.2.4. Proposition 4: Barriers in the way of technological transformation

The construction of factor interactions (direct effects) and the resultant consequences (indirect effects) leading to Proposition 4 is explained in Table 6.5 and represented visually in Figure 6.4. These interactions involved seven factors: leadership and support, organisational structure, stakeholder engagement, technology acceptance, technological readiness, organisational culture and organisational politics.

Empirical Evidence Examples	Direct Interactions	Effects/Factors	Indirect Effects/Implication
<p>“Change management was very weak in the project... This is very difficult and not happening as planned.”</p> <p>“... But the change management, again, is the weakest link, and there’s a low pressure from top management.”</p> <p>“... There was internal resistance from the ministry, particularly staff who were not engaged in the project from the beginning, and their perception now that a system is not theirs.”</p>	Ineffective change management (leadership and support) and late stakeholders engagement allowed political conflicts (organisational politics) to take place which affected technology acceptance.		Slow technological transformation within an organisation
<p>“The change here takes a lot of time going through the hierarchical structure...”</p>	Organisational hierarchy (organisational structure) affected decision-making (organisational politics) process during implementation.		
<p>“We suggested a new structure, but it wasn’t followed because organisations want to keep their responsibilities inside, as part of their job, and were afraid of a shifting power. Decision makers want to keep their influence on decisions.”</p> <p>“... Middle managers tend to resist the idea as their power is shifted away.”</p>	Organisational politics influenced technology acceptance by the stakeholders.		
<p>“Nevertheless, going paperless was a challenge because some staff didn’t stop asking for paper documents as they used to do in the past.”</p> <p>“... People were used to feel paper, tangible things. They want to see stamps and signatures on papers... the thing that took us about two years to penetrate into the minds of people, especially the staff. Staff were not ready to accept the change and tended to keep the traditional way of working, such paper-based.”</p> <p>“The data sharing culture was not present in the institutions, but it is slowly emerging.”</p>	Old mindset culture (organisational culture) has an impact on the technological readiness of the organisations and delayed technology adoption (technology acceptance).		
<p>“One of the key challenges is lack of readiness of some government organisations. There was important data needed from some organisations but there were not ready or willing to share... there was no IT team to develop the Webservices, and/or APIs for sharing the data. We suffered a lot to get this data on time.”</p> <p>“Technological readiness negatively affected integration since some organisations lack the readiness and some do not have the information systems at all. It was a barrier and caused delays in the project ...”</p>	Low technological readiness affected data sharing willingness and integration (technology acceptance) among the respective organisations.		

Table 6.5: Factors Interactions Leading to Proposition 4

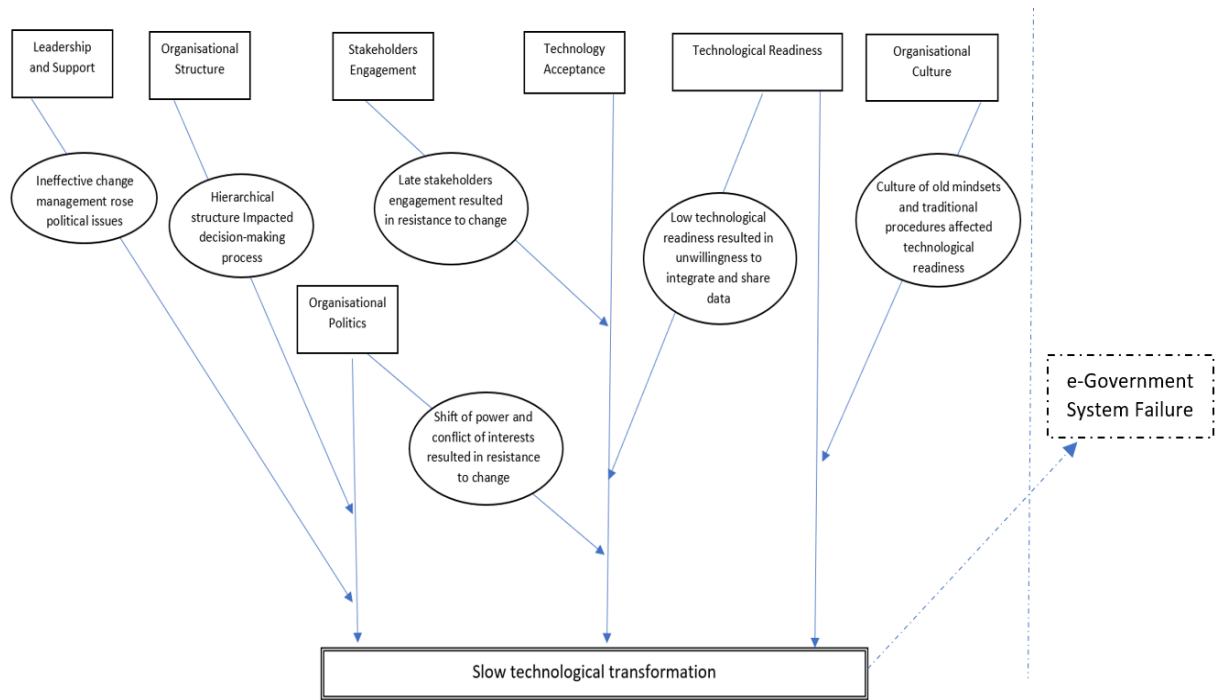


Figure 6.4: Factors Interactions Leading to Proposition 4

The factors in this scenario worked as barriers to the technology transformation aimed at the implementation of e-Government. Ineffective change management (leadership and support) and organisational structure both erected organisational politics. The change management programme (leadership and support) and the late stakeholders' engagement were perceived as ineffective, particularly in MOCI, which allowed political conflicts to take place. The inherent organisational hierarchy (organisational structure) also interrupted the process of decision-making during implementation. For example, middle managers tended to influence the decisions taken in the projects. These political issues, in turn, influenced technology acceptance as a result of a shift of power and conflict of interests, which were perceived as resistance-to-change behaviour. Further, a culture of old mindset (organisational culture), such as sticking to old procedures, had a negative impact on the technological readiness of the organisations and delayed technology adoption. Consequently, the low technological readiness, due to the lack of the needed IT infrastructure and technical knowledge, impacted technology acceptance, which was perceived as an unwillingness to integrate and share data. As a result, the implication of these interactions was a slow technological transformation. This finding agrees to some extent with the results of Bakunzibake et al. (2019), who posited that poor IT infrastructure (i.e., technological readiness) and improper organisational structure were among the barriers that hindered

technological transformation. Tangi et al. (2020) also indicated that the structural and cultural barriers of organisations were among the most cumbersome factors impeding digital transformation. It was observed, however, that organisations with high technological readiness were perceived as more collaborative and open-minded than low readiness ones. This view, in particular, is in line with Yang and Wu's (2014, 2016) results, which indicate that government organisations that have a culture of open innovation tend to support innovative practices and foster data sharing with other organisations. With respect to organisational politics, the finding in this study is consistent with prior studies that concluded that organisational politics in inter-organisational ICT collaboration initiatives arise due to multiple organisational and individual reasons (e.g., Bostrom & Heinen, 1977a; Gil-Garcia & Sigit, 2016; Heeks, 2006; Irani et al., 2008; Pardo & Tayi, 2007; Yang & Maxwell, 2011). For example, Bostrom and Heinen (1977a) contended that organisational politics arise due to conflicts of interest among various groups and the perception of organisations' members towards the shift of power caused by the changes entailed by information systems implementation. Gil-Garcia and Sigit (2016) reported similar results regarding conflicts of interest between organisations participating in data sharing and e-Government implementation initiatives. They found that when political conflicts existed, participants were less likely to engage in data and knowledge sharing. Similarly, Pardo and Tayi (2007), and Yang and Maxwell (2011) indicated that public sector organisations are concerned that sharing information could cause power losses, including financial assets and competitive advantages. Irani et al. (2008) observed that organisational politics influenced the decisions made during e-Government implementation projects, as such decisions were based on political reasons rather than on practical needs. Heeks (2006) also highlighted the effects of organisational politics on information systems implementation, noting that a system that works effectively in a well-managed context may not function at all in a context of political conflicts and cultural norms. In the change management aspect, Al-Moalla and Li (2010) reported that a lack of an effective change management programme was behind the slow adoption of the UAE's e-Procurement system, which resulted in negative consequences, such as a waste of time and financial resources, and featured resistance to change. Moreover, the finding regarding stakeholders' engagement is consistent with the argument of Nadin et al. (2001), who emphasised that a lack of or improper user involvement could result in conflicts and resistance to change. While there was a

lack of citizens' participation for unknown reasons, a possible interpretation of such a situation could be the absence of a participative culture among the citizens, due to the fact that Oman's experience with the concept of participation is relatively new, being put into effect in 2013, along with the establishment of its first municipal council (Central Intelligence Agency, 2020; The Heritage Foundation, 2020). This result is partly supported by the study of Damodaran et al. (2005) regarding e-Government implementation in some LGAs in the UK, in which they reported that citizens had little input into the creation and development of e-Government in these authorities. However, in a recent study, Choi and Song (2020) found that citizens with stronger trust in government had a better tendency to participate. Hence, the following proposition emerges:

Proposition 4: Technological transformation within the organisation can be negatively impacted by the structural and cultural barriers of the organisation, such as. These barriers can, if ignored or improperly addressed prior to e-Government system implementation, weaken the technological readiness of the organisation and thus slow down the planned technological transformation.

6.2.5. Proposition 5: Trust and e-Government success

The construction of factor interactions (direct effects) and the resultant consequences (indirect effects) leading to Proposition 5 is explained in Table 6.6 and represented visually in Figure 6.5. The interaction of such scenarios involved seven factors: trust, data quality and standards, technological readiness, technology acceptance, data security and privacy, networking and perceived costs and benefits.

Empirical Evidence Examples	Direct Interactions	Effects/Factors	Indirect Effects/Implication
<p>"Most of MOMP integrations are on the IS levels. They have Webservices for data sharing with other government organisations and our all integrated parties use the same technology."</p> <p>"The architecture of integration is quite comprehensive. We obtain and share part of the data through ITA data hub (ESB)..."</p> <p>"There is a trust, and the effect is highly positive. The data of InvestEasy is shared through ITA with high trust."</p> <p>"Other stakeholders have a high trust and complete confidence with MOMP because of our very high technological readiness."</p>	<p>Technological readiness and trust influenced adoption of IT (technology acceptance), such as e-Services.</p> <p>Technological readiness reinforced trust, data quality and</p>		<p>Successful e-Service or system implementation</p>

<p>“Now we are integrated through ITA-ESB... For example, integration with PASI, MOCI and PAMR, which are key stakeholders of the project, is through ESB for security and [data] standardisation reasons.”</p>	<p>standards, and data security and privacy.</p>	
<p>“One of the implications of networks is that it makes people feel they are part of the project, and they are concerned.”</p>	<p>Trust was also promoted by networking, perceived benefits (perceived costs and benefits), data security and privacy and data quality and standards.</p>	
<p>“After successful run of the project it [trust] became high.”</p>		
<p>“With respect to inter-organisational trust, we sign data sharing agreement with any participating organisation exchanging data with us to protect data security and privacy on both sides”</p>		
<p>“Of course, we are sure they are correct as for the main data items (name, civil number, birth date and birthplace).”</p>		

Table 6.6: Factors Interactions Leading to Proposition 5

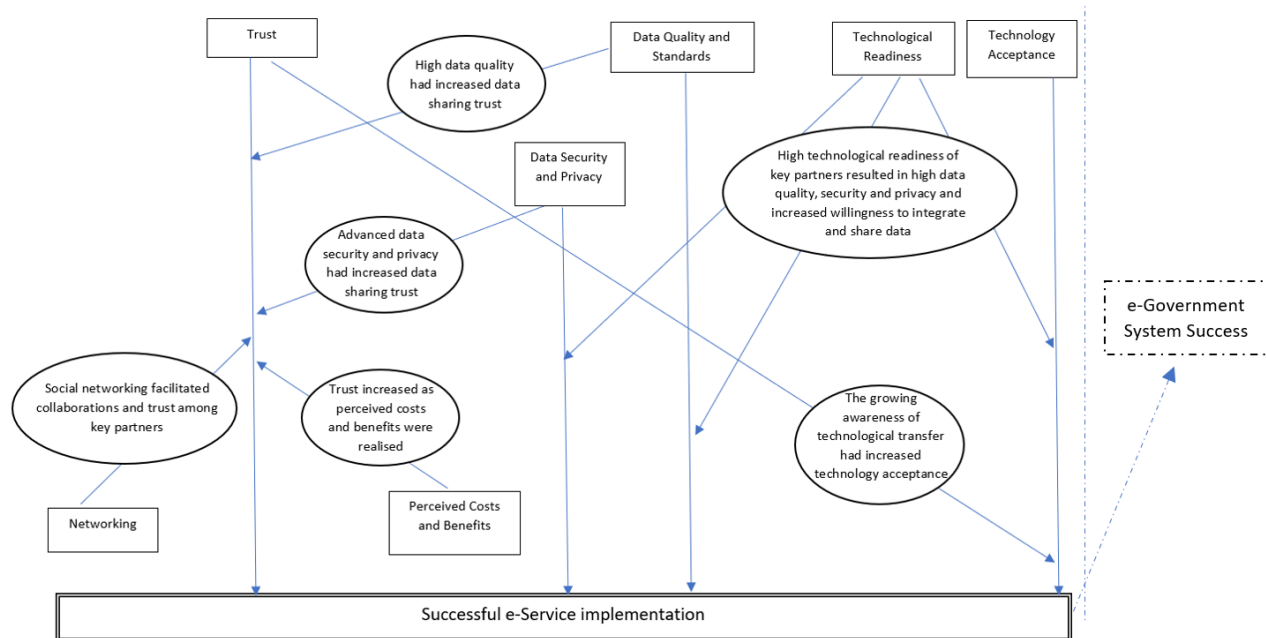


Figure 6.5: Factors Interactions Leading to Proposition 5

The collative influence of the eight different interactions among the factors facilitated successful e-Government implementation (Figure 6.5). High technological readiness and trust were the two most focal factors influencing technological transformation and adoption of IT solutions (technology acceptance), such as e-Services. As Figure 6.5 illustrates, trust was promoted by two key social factors—networking and perceived costs and benefits—backed by advancements in data security and privacy and data quality and standards. It was also evident that high technological readiness reinforced data security and privacy, as well as data quality and standards, and positively promoted the culture of data sharing willingness in the organisations (i.e., technology

acceptance). The empirical findings also revealed that the high technological readiness of the three organisations, along with the technical support of the ITA, played a crucial role in reinforcing stakeholders' trust. Participants reported that inter-organisational trust increased as the outcome of the implementation became visible and the benefits of the e-Government system were realised. Further, citizens' awareness of using the technology grew and resulted in trusting public information systems and e-Services. Therefore, the implication of this complex interaction was successful e-Service implementation. These empirical findings are in line with many studies in the literature. For instance, prior research has indicated that facilitating the conditions of trusted networks is key to effective and sustainable collaboration (Gil-Garcia et al., 2010; Gil-Garcia & Sigit, 2016; Pardo et al., 2008). Trust has also been identified as a critical factor that can facilitate effective communication and information sharing between organisations (e.g., Willem & Buelens, 2007; Yang & Wu, 2014). Moreover, Gil-Garcia and Sigit (2016) argued that the mutual trust and respect built among the participants through the authority of the executives is critical to the success of inter-organisational data sharing. In the e-Government context, Welch and Pandey (2008) indicated that data quality and trust positively affect each other, while Alzahrani et al. (2017) found that trust influences technology acceptance. This study's empirical evidence is also consistent with the work of Yang and Wu (2016), who found that the influence of the outcome gained from networking between organisations to obtain necessary resources to implement open data in China significant. This is also in line with DOI theory (Rogers, 1995), which states that during the innovation process, obtaining support from others to support innovations and solve problems is essential within a social system of interrelated individuals or organisations. The outcome of these interactions provides evidence for Bigdeli et al.'s (2013) and Kamal et al.'s (2015) studies, which confirmed that organisations with advanced levels of technological readiness have a better intention to engage in e-Government projects and/or data sharing initiatives. This finding is also in line with the theory of TAM (Davis, 1989), which suggests that people's intention to accept technology is based on perceived ease of use and perceived usefulness. Hence, the following proposition was drawn:

Proposition 5: Trust is a critical and extremely significant element in the e-Government context and a project's success and is hard to attain. Achieving

trust within e-Government stakeholders depends on both the salient presence and positive influence of human-related behavioural factors and the efficiency of technological and data readiness aspects.

6.2.6. Proposition 6: Effects of perceived risks and subsequent lack of trust on e-Government

Unlike the case in Proposition 5, this study encountered a situation of unsuccessful e-Government implementation in Proposition 6. In fact, this is the other side of the coin revealed as a result of the field study data. It adds further insight and suggests that when we consider other factors and aspects—that is, risk perception—the interactions of socio-technical factors can lead to adverse results for the e-Government project. The construction of factor interactions (direct effects) and the resultant consequences (indirect effects) leading to this proposition is explained in Table 6.7 and represented visually in Figure 6.6. This situation involved six factors: data security and privacy, data quality and standards, perceived risks, IT infrastructure and interoperability, trust and technology acceptance.

Empirical Evidence Examples	Direct Effects/Factors Interactions	Indirect Effects/Implication
<p><i>“I am currently telling you about the problem of linkage [data sharing] because some organisations say their data are more accurate than those of others and that any linkage would damage their data.”</i></p>	<p>Invalid data, outdated (<i>data security and privacy</i>), or below the quality standard (<i>data quality and standards</i>), had raised opportune risk (<i>perceived risk</i>) which led some organisations to reject the data or even refuse to collaborate (<i>technology acceptance</i>).</p>	<p>e-Service or system failure</p>
<p><i>“... For example, in the Ministry of Civil Service, the civil number of a person is that of another at the ITA, which causes hindrance and problems. This is one reason why the institutions are reluctant to connect.”</i></p>		
<p><i>“Data security and privacy has negative effect because many organisations are reluctant to share data, except for some organisations that also allow sharing of open data.”</i></p>		
<p><i>“The integration with ROP legacy systems is risky as there’s not enough support provided because ROP has little interest in the old systems, and they are phasing them out.”</i></p>	<p>Risks were also perceived (<i>perceived risk</i>) from aged/old legacy systems (<i>IT infrastructure and interoperability</i>) that were obsolete and lacking vendor support.</p>	
<p><i>“A large proportion of the citizens still relies on Sanad services, and they are not very confident to apply for the services on their own.”</i></p>	<p>Perception of risk (<i>perceived risk</i>) negatively influenced citizens’ <i>trust</i>. Citizens tended to use the traditional services provided by private brokers, which left the newly developed self-services unused and eventually failed (<i>technology acceptance</i>).</p>	

Table 6.7: Factors Interactions Leading to Proposition 6

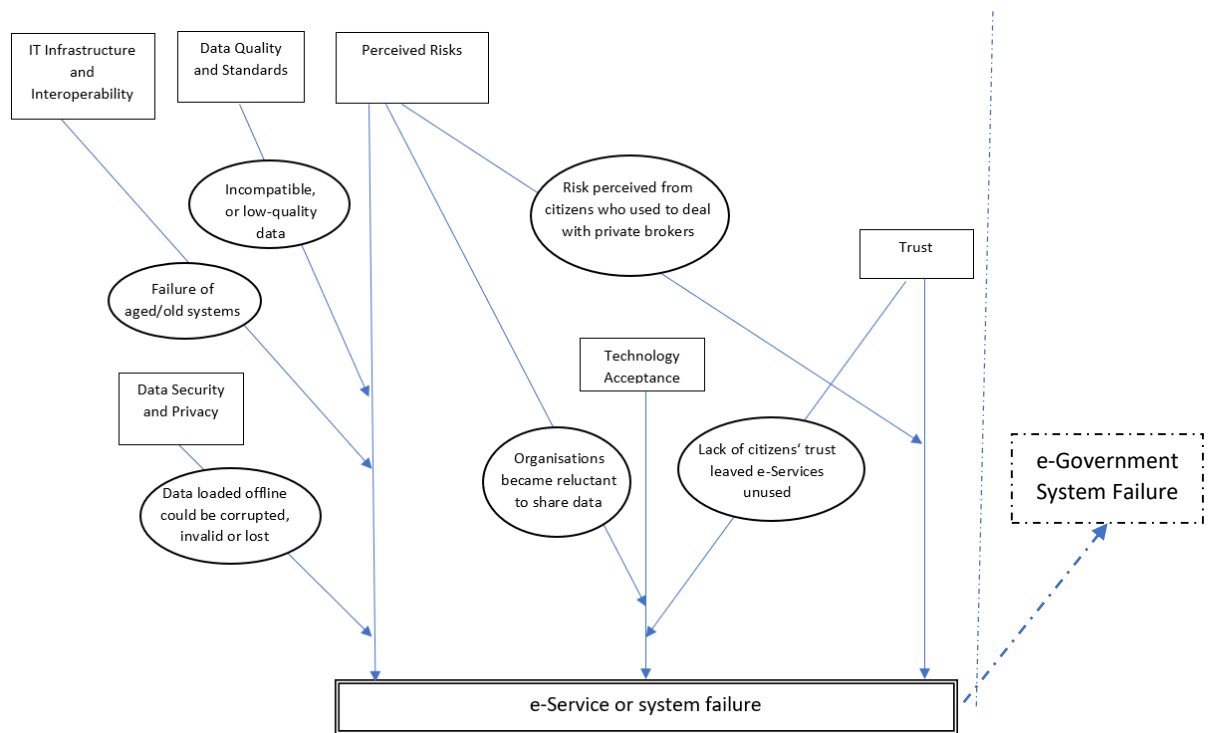


Figure 6.6: Factors Interactions leading to Proposition 6

The five different interactions centred around perceived risks. Risks, in the particular situation of this case, were perceived from different sources, as the interactions in Figure 6.6 suggest. For example, data lost or found invalid (data security and privacy) or those below the quality standard (data quality and standards) raised opportunity risk, which led some organisations to reject the data or even refuse to collaborate. There were also risks perceived from aged legacy systems that were connected electronically with the enterprise systems supporting the electronic services. Such legacy systems were obsolete and lacked vendor support, the failure of which may not be tolerated. Perceived risks also affected citizens' trust in adopting self-services, particularly those who applied to public services through private brokers (e.g., Sanad offices). This was due to the fear that their applications might fail to be processed and eventually rejected. Such behaviour left the newly developed self-services unused (technology acceptance), and eventually, they failed. Hence, this interaction resulted in an e-Service or system failure. These findings are consistent with many researchers who argued that perceived risk is one of the key potential factors influencing e-Government implementation and its success, specifically data sharing activities (e.g., Bigdeli et al., 2013; Dawes, 1996; Dawes et al., 2009; Kamal et al., 2015; Welch et al., 2016; Yang & Wu, 2016; Yang & Wu, 2014). In accordance to what this study uncovered, Yang and Wu (2014) found that organisations acting as information

providers have two perceived risks towards information sharing: concern about information quality and concern about information misuse. Similarly, the empirical results of Yang and Wu (2016), and Welch et al. (2016) indicated that perceived risks have a negative effect on government organisations' willingness to share data, including concerns over data privacy, data quality, data misuse, and other potential risks such as losing valuable assets. In relation with trust, researchers (e.g., Gil-Garcia & Flores-Zúñiga, 2020; Zhang et al., 2018) argued that the risks perceived by citizens can significantly affect their trust and, as a result, negatively influence their use of e-Government services. Accordingly, the following proposition is offered:

Proposition 6: Risk perceived from the factors of data and IT infrastructure may lead to serious implications for the effort of e-Government implementation. This perception of risk can have a negative impact on organisations' willingness to share their data and negatively influence citizens' trust in adopting e-Government services, which eventually leads to the potential failure of the e-Government system and the project's success.

While the above propositions may not come as a surprise, they can be important for understanding real issues in the process of e-Government implementation. In other words, many issues leading to e-Government implementation success or failure are not simply technically related but can also be the result of general socially relevant factors that may not have been foreseen at the planning stage of the project. This invites further investigation into how the design of technical solutions for e-Government should be pursued with consideration of potential non-technical (social) factors.

6.3. Summary

By drawing on STS theory, this chapter has presented an analysis of the interactions of the social-technical factors and addressed their implications for the implementation and success of e-Government in terms of propositions for future research. To this end, the chapter provided a holistic analysis of the effects of the key socio-technical factors on the implementation and success of e-Government. Chapter 7 of the thesis proceeds by concluding the research, presenting the outcomes, major contributions, implications, limitations and recommendations for future directions.

CHAPTER 7: Conclusion

7.1. Introduction

Chapters 5 and 6 discussed the study findings, the effects of socio-technical factors and the implication of their interaction for e-Government implementation and its success.

This present chapter is the final part of this work and provides the research conclusion. The chapter is organised into six sections. Section 7.2 presents the main research outcome and key findings by offering a systematic mapping of the outcome to the research question and objectives. Section 7.3 demonstrates the research contribution and highlights theoretical implications. Section 7.4 illustrates the practical and policy implications of this research. Section 7.5 sheds light on research limitations and suggests directions for future research. Finally, Section 7.6 summarises the chapter.

7.2. Research Outcome

This study explores the effects of socio-technical factors and the implications of their interactions for e-Government implementation and its success. The study was driven by the researcher's practical reflection from the fieldwork in the public sector in Oman, where he witnessed various challenges in e-Government development, including a slow transformation to e-Government. This study initially proposed to explore the implementation of enterprise application integration in back-office information systems across public sector organisations. However, the data collection and analysis revealed multiple e-Government implementation issues in Oman. Thus, the study considered a broader approach that can better fit the scope and context of the investigation. Accordingly, the problem was examined using a holistic perspective in which STS theoretical lens has been found relevant and applicable.

The lack of socio-technical balance in the current implementation approaches is the key reason for the high rate of failure in IS and e-Government projects. The current e-Government development approaches offer limited knowledge about the effects, implications and attributes of organisational changes (Nograšek & Vintar, 2014). As a result, the socio-technical nature of e-Government is not completely addressed. Moreover, how social and technical factors interact and affect each other is

underexplored as well as the implications of their interactions for e-Government implementation and its success.

Accordingly, this research has contributed to mitigating the risk of e-Government implementation projects' failure by proposing a multidisciplinary, socio-technical approach. This approach helps to understand the holistic picture of the e-Government system and the complex intertwining relationships of the socio-technical factors influencing e-Government implementation and its success. The study sought to answer the research question: *What are the implications of socio-technical interactions for the success of e-Government implementation, and how they may be addressed to reduce the risk of e-Government projects' failure?*

The outcome of this study suggests that examining e-Government implementation from a holistic view through STS can help significantly reduce the complexity of e-Government systems and facilitate the understanding of the various tangled implementation issues. Thus, focusing on only one side of the socio-technical reality of the phenomenon or failure to address the interaction between factors cannot provide a comprehensive collective view of e-Government. Consequently, proper theoretical perspectives are not obtained when making decisions, for instance planning, implementing and managing resources during the process of implementing e-Government. Analysing and decomposing socio-technical factors and their interactions provide insights into identifying the root cause of implementation issues and a reliable approach to managing e-Government implementation projects. Hence, the analysis of socio-technical interactions contributes to reducing the risk of e-Government project failure.

In addition, the study results indicate that the socio-technical factor effects identified in this study are mostly consistent with those reported in the extant literature. The findings of the analysis of socio-technical factors' interaction presented in terms of theoretical propositions further support the extant literature. These findings have been validated against the extant literature as they have been examined from the STS perspective. Thus, significant insights are provided to policymakers in the public sector to revisit and review e-Government implementation policies and strategies. Therefore, the findings confirm that the success of e-Government implementation

largely depends on how well public organisations manage the socio-technical influential factors and their interwinding relationships.

In addressing the research objectives towards answering the research question, the following can be confirmed:

- The key socio-technical factors affecting e-Government implementation have been identified from the related literature, and the conceptual framework for e-Government implementation has been developed (Chapter 3). Therefore, objective 1 has been met.
- The effects of the socio-technical factors on e-Government implementation and its success have been empirically investigated and analysed (Chapter 5) using the research methodology and design of this study (Chapter 4). The findings have been reported, satisfying objective 2.
- The interactions of the socio-technical factors have been identified and analysed. The implications of their interactions for e-Government implementation and its success have been addressed using a series of propositions (Chapter 6). Therefore, objective 3 has been met.

In addressing these objectives, it can be concluded that the research question has been answered.

7.3. Research Contribution

This study offers three major theoretical insights by which e-Government, information systems and public administration areas, as well as STS theory, may be informed.

Firstly, the extant literature suggested that current e-Government implementation approaches have been deficient. The current stage models offer only little in capturing the effects, implications, and attributes of the changes happening inside organisations (Nograšek & Vintar, 2014). They also failed to provide sufficient details about the socio-technical nature of e-Government and explain the high failure rate in e-Government implementation projects. Thus, this research contributes to addressing this theoretical gap by offering theoretical insights by adopting a multidisciplinary socio-technical approach to investigating e-Government implementation.

This study addresses prior scholarly calls (e.g., Dawes, 2009; Gibreel & Hong, 2017; Heeks, 2006; Kompella, 2017; Pardo et al., 2004; Yang & Wu, 2016) to conceptualise

e-Government as STS to understand the holistic picture of the phenomenon. Hence, the STS theory was reviewed to set the theoretical background for this study and develop a socio-technical conceptual framework to guide the empirical investigation of the research problem. Therefore, the conceptual framework demonstrates a baseline for understanding the problem while offering a theoretical and conceptual map that e-Government researchers can use, expand on and/or empirically validate in other contexts.

Secondly, to the best of the researcher's knowledge, extant theories have failed to explain how social and technical factors interact and affect each other and their implications for e-Government implementation. According to Volmar and Eisenhardt (2020), theory development is sought when current theories fail to fully explain a focal phenomenon. This research has empirically explained how social and technical factors interact and affect each other and their implications for e-Government implementation and its success. These implications have been addressed, identified and explained using data analysis. Then, the combined outcomes of these implications have been presented as theoretical propositions. Although not all the findings may be considered as new to knowledge, most of them contribute to the existing e-Government knowledge by devising new grounds for extending the theory and through their applicability in future research.

Therefore, the novel contribution of this study is exemplified by analysing and explaining the interactions of the socio-technical factors and their resultant implications in different occurrences. These phenomena were captured from the data and represented in diagrammatical models leading to the theoretical propositions. Such work offers significant insights into e-Government and STS research for the application of these models to capture the implications in other contexts. It also opens new avenues for researchers to validate the outcomes of these implications (i.e., theoretical propositions) empirically or extend them for future research development.

Accordingly, this research has contributed to expanding the applicability of STS theory to the study of e-Government implementation, prompting further development of the theory. This study responds to the calls by researchers, such as Bostrom and Heinen (1977b), Davis et al. (2014), Eason (2014) and Mumford (2006), to expand the STS conceptualisation and apply its core principles to new research areas

outreaching the typical focus on technology and work organisation. They argued that the application of the socio-technical perspective to new fields of study helps in investigating modern critical issues and fostering a progressive theoretical development of STS theory simultaneously.

Thirdly, although this research is a qualitative study grounded in the Omani context and its outcomes may not be entirely generalisable, other researchers can still relate their findings with those reported herein. Davis et al. (2014) argued that socio-technical models can be used to participate in predictive studies and substantially contribute to the design and governance of high-potential projects. The literature indicated that e-Government implementation projects in developing countries are underexplored. Nevertheless, conducting this study in a developing context has offered further insights into the contextual and emergent factors of success and failure, including those related to economic, political and socio-cultural settings.

7.4. Implication for Practice and Policy

This work also has important practical and policy implications in addition to the theoretical contributions. The study has empirically investigated the implications of socio-technical interactions for e-Government implementation and its success in Oman. Accordingly, three case studies were analysed, focusing on a single e-Government implementation project from each study as the unit of analysis. The three projects under examination have various stakeholders from multiple organisations. Thus, the projects were examined in an inter-organisational setting. Therefore, the practical implication of this study for policymakers and e-Government project implementers is multi-faceted.

The implications of socio-technical interactions for e-Government implementation and its success were analysed based on STS theory. The use of the theory helps practitioners to understand how these factors interact and affect each other to influence the implementation and offers them significant managerial insights into managing e-Government implementation projects. For example, this approach can be useful to understand and resolve the complexity of the interwinding relationships of the socio-technical factors. Moreover, it can resolve situations where particular technical and managerial practices and human behaviours can arise during e-Government implementation projects. In doing so, particular situations that hinder the

implementation may be avoided or tolerated, and those that facilitate it can be further developed. Moreover, modelling these interactions in a diagrammatical form can help practitioners gain a comprehensible picture of the factors involved and thus facilitate resolving the factors' interdependencies. The interaction models also present a diagnostic tool to gain improved control of the factors and aids in anticipating direct and indirect implications of such practices and behaviours. Thus, the diagrammatic models offer great opportunities to avoid failure and increase the success rate entirely or partially. Although such scenarios presented in this study may not necessarily occur in every e-Government and information system project, the interaction models are useful to relate other situations with those in this study.

The socio-technical factors identified in this study have played a crucial role in influencing e-Government implementation and its success in Omani public organisations. Therefore, managing these factors effectively will help improve e-Government implementation, thus creating conditions for improved inter-organisational data sharing, business process integration, service delivery and citizen satisfaction.

Furthermore, the study elucidates that realising e-Government objectives in practice is challenging and that a tighter focus is needed to develop strategies for minimising the negative impact of these challenges, factors and related issues. This explanation is based on the e-Government implementation challenges outlined in Chapters 2 and 5 and the socio-technical factors identified in Chapter 3 and examined in Chapters 5 and 6. Hence, appropriately addressing these socio-technical factors will improve e-Government implementation and reduce the risk of e-Government project failure in Oman. Thereby, a set of managerial and policy implications can be drawn from this study, which can be addressed to the decision-makers of the Omani government as discussed below.

7.4.1. Implication for Staff Motivation and Incentives

The study findings indicate that the current situation severely impacts the working staff as it overloads workers with no satisfactory rewards. Staff motivation and incentives had been low, which is entirely inconsistent with STS design principles. According to Bostrom and Heinen (1977b), STS design should target dual improvement in the workplace and social life of the individuals within the work

system. Thus, the staff's social life and technology should be considered equally. Without appropriate incentives and compensations, IT professionals' turnover would increase, resulting in a scarcity of skills needed to implement and manage e-Government projects and IT infrastructure. A lack of skilled personnel has been identified as one of the constraints of e-Government implementation in developing economies (e.g., Gunawong & Gao, 2017). The presence of monetary and other types of incentives would also help to reduce employees' negative behaviours towards technology. The literature has reached a consensus that organisational performance is a function of fit between social and technical factors (Avgerou & LaRovere, 2003; Bostrom, Gupta, & Thomas, 2009; Fountain, 2001; Pardo et al., 2004; Walker et al., 2008). Most failures in information systems (aka e-Government systems) have been attributed to behavioural issues (Bostrom & Heinen, 1977a, 1977b).

7.4.2. Implication for Change Management

A sound strategy and action plan for change management are necessary for a smooth and successful transformation. It was perceived from the participants that change management aspects, particularly in the InvestEasy project (MOCI), had not been properly practised and disseminated across the administrative levels. This situation resulted in low system acceptance due to conflict of interests, personal and political agendas and other cultural issues, leading to the slow adoption of e-Services. Lack or inefficient change management is one of the significant reasons behind information system failure (Bostrom & Heinen, 1977a) and slow adoption of e-Government systems (Al-Moalla & Li, 2010). Bostrom and Heinen (1977a) have emphasised that change must not entirely be delegated to technical system designers as they may fail to appreciate available opportunities for technical solutions.

7.4.3. Implication for Capacity Building and Knowledge Transfer

Public organisations shall work towards technical knowledge transfer from the vendor to technical teams to maintain e-Government system sustainability. However, in the long term, investing in building national technical capacity in the ICT market is strategically advisable to the Omani government. Such capacity can cater to the need for professional expertise and respond to the unique experience of Oman in e-Government implementation and diffusion. The literature has reported that the lack of

organisations' technical capacity is a key barrier to e-Government success and data sharing initiatives (Gil-Garcia, 2012; Yang & Wu, 2014).

Building national capacity would also offer improved insights into understanding socio-cultural issues and reducing dependency on vendors. This strategy helps to avoid the risk of vendor-locked situations (given that the three strategic projects have been assigned to a single international vendor), save operating costs and reduce budget leakage. One interesting point here related to this issue is that one could ask, 'Could hiring a single vendor across the three projects be a focal factor of good practice of project governance and operations?' However, this topic is beyond the scope of this study and may call for further investigation. Accordingly, ITA decision-makers were questioned about the advantage of or reason for assigning this single vendor (i.e., Nortel from Estonia) across the three high-potential projects. The answer received was based on two reasons. Firstly, the government found that the tendering bid submitted by this vendor is the best match for its established selection criteria. Secondly, the Estonian business model, particularly regarding the InvestEasy project (MOCI), is one of the best practice models in the world.

7.4.4. Implication for Policies and Legislations

Policies and legislations can influence data and resource sharing and knowledge exchange among public sector organisations. However, a lack of national legislation policy for data sharing and privacy was observed. Thus, the need to establish national legislation is proposed by which inter-organisational data and information sharing among participating organisations becomes operative and legitimate. These legislations shall also include methods and standard frameworks for establishing electronic connections, business process integration and information system interoperations.

7.4.5. Implication for e-Government System Sustainability

Although this point concerns the InvestEasy system of MOCI, it can further be generalised to other e-Government systems providing online public services. In the case of MOCI, it has been proposed to privatise the management of the InvestEasy system by establishing an independent business centre or a joint public-private partnership (PPP) venture. This proposal is based on the condition that the government

environment may not have the needed capacity to deal with a substantial system. During the data collection, one of the decision-makers stated that MOCI had already initiated a proposal for the PPP model for system management, operation and evolution to enhance service quality and unlock the vendor's dependency. Such an initiative would create innovation opportunities and financial investment sharing between the public and private sectors. Moreover, the government may not maintain a sustainable service in the long run due to the regulations and practices it follows in case of budget shortages. Such situations would most probably fail to attract financial resources and motivate the staff and cope with technological changes and different pressure factors. Therefore, the researcher advocates such an initiative to improve system management and operational effectiveness. Consequently, organisational performance improves, attracting additional investors.

In addition, the current organisational structure and culture across the three cases were perceived as a barrier to effective e-Government implementation. This barrier may also call for restructuring the administrative organisational systems to align with the functionality of the e-Government system and facilitate smooth adoption.

7.5. Research Limitations and Future Direction

This research has numerous limitations that require future improvement. The list of limitations is not exhaustive; however, it is desirable to address here those known to the researcher.

The study has explored three e-Government projects, each of which is owned by a single public organisation, though other external organisations were involved. These owners include primary stakeholder organisations of the three projects that were involved closely. Their respective business process was integrated as part of the service offered. They also include secondary stakeholder organisations that were involved in data sharing and exchange and interested in the outcome of the services offered. Although the project owners (i.e., case organisations under study) had different functions and roles, they shared common settings, such as the same implementation vendor, similar levels of technological readiness and the same financial status and the success of all their projects. Such settings may have produced case studies that are likely homogenous and may not develop unique features of each case. This condition may have prevented the diverse information in qualitative studies.

Taking diverse settings may have brought richer results and deeper insights. However, the three projects were national-level enterprise strategic projects that have a significant socio-economic impact on the country's resources and citizens and thus were recommended for study. Nevertheless, the data used in this study were collected with diversity and dissimilarity. Moreover, the varying opinions and perceptions of different participants across administrative levels were considered to bring the required richness to the study.

Although a few citizens were interviewed as part of this study, citizens' inclusion added only limited perspectives to this study, which is one of the study limitations. Thus, the full picture of e-Government performance may not have been realised, requiring future research. Bringing the full view is important to understand the phenomenon holistically as case research suggests. However, obtaining citizens' perspectives requires considerable time and involves another research method, such as close-ended questionnaires. This additional method further suggests the use of the mixed method. Thus, the researcher opted not to include the entire citizens' views but concentrated on the internal employees and their perceptions on socio-technical issues.

Future research may consider a citizen's account using a quantitative sample along with mixed methods and triangulation techniques to reduce bias and improve research outcomes. Joseph (2013) argued that the use of mixed methods is desirable particularly in e-Government research because of the inter-disciplinary nature of the e-Government domain area. In this regard, the author also noted that mixed methods can produce detailed observations and interpretations of results than a single method while considering time and resource constraints that may hinder the mixed-method approach. Similarly, Omar et al. (2020) had encouraged e-Government researchers to use mixed methods to generate new theories devised from empirical evidence and rational judgement.

This study encountered time constraints and limited availability of the participants in the designated case organisations. Thus, a pilot case study was not developed before conducting the study of the potential cases. A pilot case study could have facilitated further improvement to the interview agenda and generated additional concise questions. The pilot case study can be useful in improving the research method and allowing the researchers to enhance research questions while also reflecting on the

research design (Yin, 2014). Nonetheless, the advisory panel's review of the interview agenda and question type offered an acceptable quality level to the questions. Furthermore, the recommendations and guidance provided by the panel for conducting the face-to-face interviews were significantly beneficial.

Two of the projects investigated through this study were ongoing, namely, AMMS of MOMP and InvestEasy of MOCI. These projects do not have a designated deadline as they are incremental in nature, and any service or function developed is added progressively to the service portal for use in production. In contrast, the e-Census2020 of NCSI has not met the deadline (at the time of data collection). Thus, a longitudinal study is deemed useful to investigate the types of ongoing projects to gain additional practical and textual insights over time. These insights help to inform the theoretical and conceptual parts of the research. Researchers, such as Joseph (2013) and Omar et al. (2020), advocated the use of longitudinal studies to enrich the methodological rigour of e-Government research. For example, Omar et al. (2020) argued that longitudinal studies can capture the temporal aspects of change. They stated that longitudinal studies are useful to understand the interaction between social and technical systems, where the interactions could occur regardless of time and place, and hence need to be observed along the line.

This study is restricted to a single country, that is, Oman. The research context is specific, and the generalisation of the conclusions drawn from this context is limited. Nevertheless, the findings are relevant to other settings, albeit developing states. Future research conducted in different geographical locations would verify the findings of this study and offer a comprehensive body of knowledge and complementary insights into e-Government.

Lastly, the implications of the socio-technical interactions presented in Chapter 6, which emerged from the data, represent a new contribution to the e-Government research area. These models of interactions and their resultant implications have been developed drawing on the researcher's interpretation of the analysis and synthesis results. Thus, these implications have been considered as propositions for further empirical validations to develop a theory around them. Each of these propositions can be considered for future research using qualitative analysis or quantitative survey methods by deriving a set of hypotheses from them.

7.6. Summary

This chapter has provided an overall conclusion about this thesis. It has addressed the research question and objectives and presented the outcome of the thesis. The chapter has also demonstrated the theoretical and practical contributions and implications of the research, emphasising socio-technical interactions as the novel contribution. This chapter has also revealed the research limitations by highlighting areas of improvement and recommendations for future research directions. Finally, this chapter offers practical recommendations to e-Government decision-makers in Oman.

This thesis aimed to present the objective of this research project and the significance of the research outcome to theory and practice.

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Appendix A: Interview Agenda

This interview agenda covers questions related to the nature of e-Government implementation focusing on socio-technical perspectives. The questions are divided into five main sections:

Section A: General interviewee information.

Section B: Information regarding strategy, governance, and general implementation issues of Oman e-Government.

Section C: Background information about case organisation.

Section D: Information about the e-Government implementation project in the case organisation, project stakeholders and their role, the socio-technical factors, and participants' perceptions on how the socio-technical factors have affected implementation.

Section E: General comments.

Section A: General Interviewee Information

A.1: Organisation Name:

A.2: Interviewee's Name:

A.3: Interviewee's Position/Role:

A.4: Interviewee's Department:

A.5: Interviewee's Telephone:

A.6: Interviewee's Email:

Section B: Information Regarding Strategy and Governance of Oman e-Government

B.1: Please describe the objectives of the current strategic plan of Oman e-Government (e-Oman)?

B.2: Is there any established government-wide frameworks, regarding:

B.2.1: Policies and legislation governing data/information sharing (e.g., collection, storage, sharing, dissemination, privacy, and security protection)?

B.2.2: Interoperability standards and enterprise application integration?

B.3: Please describe how e-Government projects in the public sector are governed, funded, assessed, and monitored?

B.4: In your opinion, what are the key challenges facing e-Government development in Oman?

B.5: The researcher asks about the potential e-Government projects that meet the established project/case selection criteria (as specified in the case study protocol) and their respective owners (i.e., case organisations).

Section C: Information Regarding Case Organisation Background

C.1: How many employees work in this organisation?

C.2: How many (key) public services does your organisation provide to its community?

C.3 How many citizen contacts does the organisation receive on daily basis, by the means of online, phone call and face-to-face?

C.4: Is e-Government development in this organisation part of the organisation's overall strategy (Y/N)? And how it aligns with the Oman national e-Government strategy (e-Oman)?

C.5: Can you please describe how are e-Government projects in your organisation governed and funded?

C.6: Can you please provide a historical overview about e-Government development in your organisation?

Section D: e-Government Implementation Project in the Case Organisation

D.1: Can you please describe the implementation of the <<project under investigation>> e-Government project, its motivations, and objectives?

D.2: In the literature, stakeholders of e-Government projects are identified as “those who directly or indirectly affect or are affected by the e-Government project/ system”. In light of this, can you please identify the stakeholders in this project and their roles, using the table below?

e-Government Implementation Stakeholders	
Decision Makers	CEO
	CIO/DG Information
	Head of IT/IS
	Board of Directors
Managers	Department Managers
	Project Manager
	Project Champion/Leader
	Web Manager

IT/IS Professionals	IT/IS Service Manager
	Systems Support/Engineers
	Systems Developers/Integrators
External	IT Vendors/Suppliers
	Government Agencies
	Citizens
Others (please specify)?	

D.3: Socio-Technical Influential Factors

The literature indicates that e-Government implementation may be influenced by various socio-technical factors (as presented in the table below). How has each factor/sub-factor, enlisted below, affected the implementation? Please provide further explanation if possible.

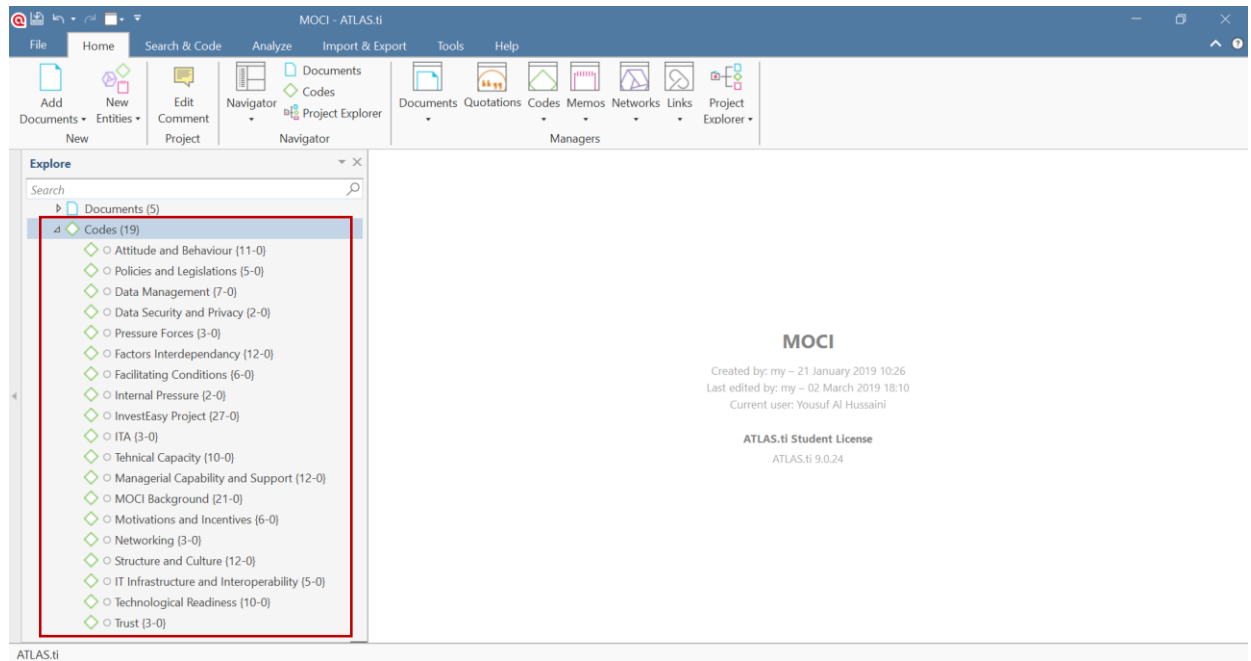
Theme	Key Factor	Sub-Factors	Effect?
Environmental	Pressure Forces	<ul style="list-style-type: none"> • Institutional Isomorphism • Media and the Public • Economic Conditions 	
	Policies and Legislations	<ul style="list-style-type: none"> • Institutional Legitimacy • Regulatory Frameworks 	
Organisational	Managerial Capability	<ul style="list-style-type: none"> • Leadership and Support • Strategic Planning 	
	Structure and Culture	<ul style="list-style-type: none"> • Organisational Structure • Organisational Culture • Organisational Politics • Business Processes • Governance and Operations • Motivations and Incentives 	
	Facilitating Conditions	<ul style="list-style-type: none"> • Networking • Trust • Stakeholders Engagement 	

	Attitude and Behaviour	<ul style="list-style-type: none"> • Technology Acceptance • Perceived Costs and Benefits • Perceived Risks 	
Technological	Technological Readiness	<ul style="list-style-type: none"> • Technical Capacity • IT Infrastructure and Interoperability 	
	Data Management	<ul style="list-style-type: none"> • Data Quality and Standards • Data Security and Privacy 	
Other factors/sub-factors not mentioned in the table (please specify)?			

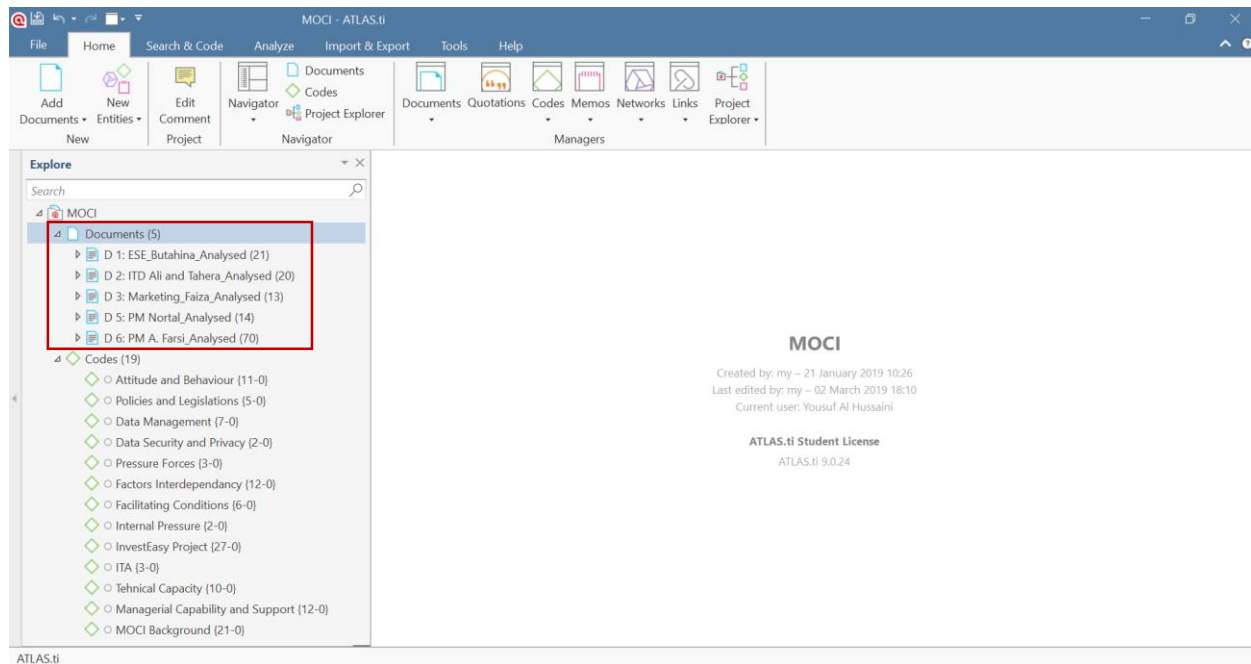
Section E: General Comments

Appendix B: Samples of Data Coding and Scanning Process

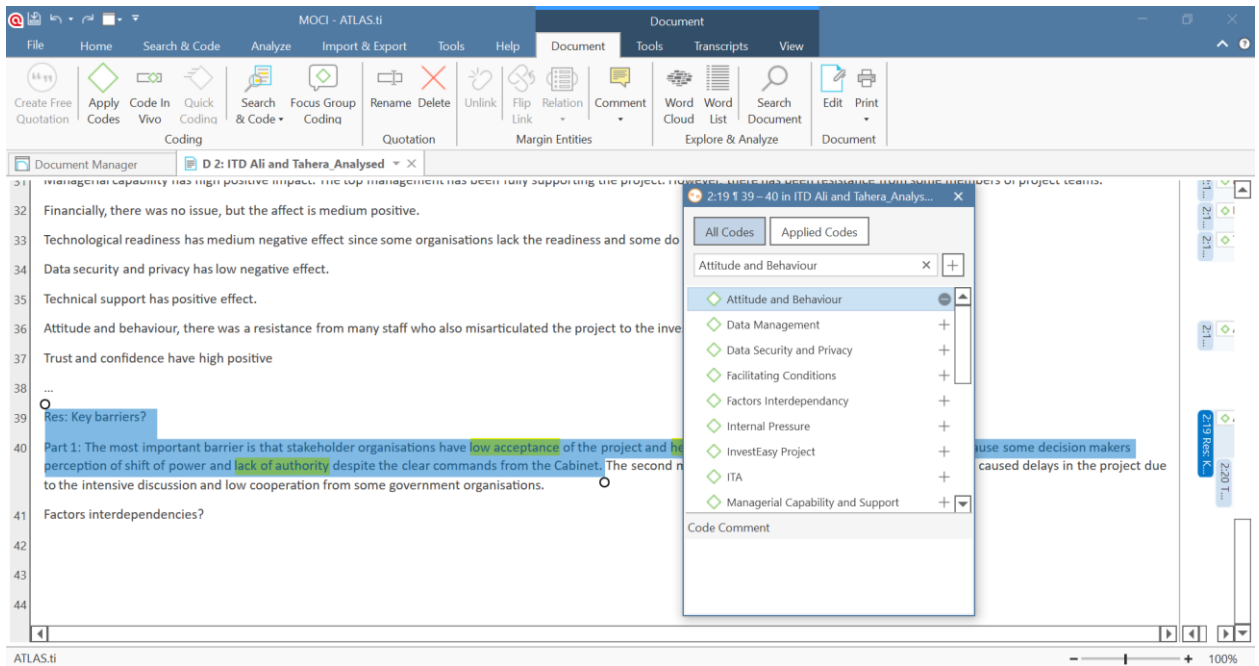
Step 1: Creation of Codes



Step 2: Uploading Documents and Transcripts



Step 3: Mapping Data to Codes



Step 4: Generation of Outcome Reports

