



**THE ADOPTION OF E-GOVERNMENT IN THE
KINGDOM OF BAHRAIN**

A Thesis Submitted for the Degree of Doctor of Philosophy

By

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Research Abstract

The last two decades have seen rapid evolution of Information and Communication Technology (ICT) capabilities in the public sector which facilitate the adoption of several IT innovations. E-government is one of these strategic innovations that many government organisations have considered adopting to deliver government information and services to citizens and to support the modernisation of their business processes. This work therefore investigates this issue through a study of the impact of e-government on government organisations and their capabilities towards the e-government adoption. This has led to developing a framework for e-government adoption that outlines the implementation process, determines critical factors influencing adoption, and identifies barriers that could keep government organisations behind the advanced stages of the implementation process. The research also proposes a novel architecture framework for e-government that offers a clear picture of ICT requirements, along with a business process model needed for the implementation for e-government. This framework also supports the researcher in terms of validating the proposed conceptual framework in case organisations. The researcher, by adopting a qualitative case study strategy, examines the proposed framework in three government organisations in the Kingdom of Bahrain.. The analysis of empirical data comes up with a novel comprehensive framework for e-government adoption in the public sector that can be a benefit in multiple ways. The major benefit of this framework is to reduce the confusion surrounding e-government adoption in the public sector by understanding the implementation process, identifying the requirements of ICT tools, and highlighting the importance of organisational readiness and the impact of the environment. The framework can also help decision makers in government to provide a clear strategic action plan for e-government. Finally, the proposed framework can be used by IT experts to estimate the progress level of their e-government projects.

Keywords: E-government, Adoption framework, Stage of growth model, E-government architecture, Case Study, Organisational factors, Technological factors, Environmental factors, Barriers, Benefits.

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Declaration

I declare that, to the best of my knowledge, no portion of the work referred to in this thesis has been submitted in support of an application for another degree, or qualification, to any other university, or institute of learning.

The thesis conforms to the British Standard BS 4821: 1990, the 'British Standard Recommendation for the Presentations of the Thesis and Dissertations', and follows the Harvard referencing system.

Zakareya Ahmed Ebrahim

Publications

This thesis gives an account of the research undertaken by the author. Some of the material contained herein has been accepted and presented in the form of the following publications:

Ebrahim, Z. and Irani, Z. (2005) E-government Adoption: Architecture and Barriers, *Business Process Management Journal*, 11(1): In Press.

Ebrahim, Z. and Irani, Z. (2005) A Model for Evaluating E-government Websites: The Case of Government Organisations in the Kingdom of Bahrain, In the Proceedings of *International Association for Computer Information Systems*, Taipei, Taiwan. 19th-21st May, [CD Proceedings].

Ebrahim, Z., Irani, Z. and Alshawi, S. (2004) A Strategic Framework for E-government Adoption in Public Sector, In the Proceedings of *American Conference on Information Systems*, New York, USA. 6th-8th August, [CD Proceedings].

Ebrahim, Z., Irani, Z. and Alshawi, S. (2004) Factors Influencing the Adoption of E-government in Public Sector, In the Proceedings of *European Mediterranean Conference on Information Systems*, Tunis, Tunisia. 25th-27th July, [CD Proceedings].

Ebrahim, Z. and Khoubati, K. (2004) Study of Integration Approaches in Public Sector, In the Proceedings of *the 9th Annual Conference of UK Academy for Information Systems*, Scotland, UK. 5th-7th May, [CD Proceedings].

Ebrahim, Z., Irani, Z. and Alshawi, S. (2003) E-government Adoption: Analysis of Adoption Staged Models, In the Proceedings of *the 3rd European Conference on E-Government*, Trinity College Dublin, Ireland. 3rd-4th July, pp. 91-102.

Chapter 1

Introduction

The importance of Information Technology (IT) for improving organisational performance has been recognised and extensively discussed by numerous researchers. While the primary awareness recently has been went to IT in the public sector. Government leaders and managers are increasingly aware of the potential of IT to improve the performance of government organisations. E-government has emerged as an instrument of IT that can bring potential benefits for government organisations, business, and citizens, such as cost saving, improved communication and coordination within and between organisations, expanded citizens' participation, and increased government accountability. Therefore, the adoption of e-government becomes an important strategic action plan for governments, since it is fundamental in modernising their business processes. However, many government organisations are still in the infancy stages of e-government implementation, since most of the organisations' websites are providing basic information and services. The reason for this that there is a confusion among government officials about the concept and strategic objectives of e-government adoption and also there is lack of knowledge in government organisations of the implementation process and critical factors that might influence the adoption. This research therefore investigates this issue through the study of the impact of e-government on government organisations and their activities towards e-government adoption. This has led to development of a framework for e-government adoption that illustrates the implementation process, critical factors influencing the adoption, and barriers that could restrict the process of implementation. This research also develops a novel architecture framework that portrays the technical and information management infrastructure that will support the e-government adoption. This chapter introduces the focus of interest of this research. It includes background to e-government adoption in the public sector, and discusses the relationship between e-government and e-commerce. It further justifies the need of e-government in government organisations and the importance of the research. The aim, objectives, and an overview of the thesis structure are presented at the end of this chapter.

1.1 Background to E-government Adoption

The adoption of Information and Communications Technology (ICT) and related practices in the commercial sectors, such as e-commerce, and the diffusion of the Internet among the general population, have resulted in a rising level of comfort and familiarity with the technologies in many contexts (e.g. communicating with people, electronic marketing, and academic activities). This has increased the expectations of citizens that public sector organisations will provide services similar to those in the commercial sector, with the same effectiveness and efficiency. A recent survey by James (2000) reported that 60 per cent of respondents believed that government organisations would be more effective if citizens could use the Internet to register their cars, pay parking tickets, fill out forms, and apply for permits. About 50 per cent thought it would be a good idea to allow citizens to vote online and have government auctions on the Internet.

Electronic government can be defined as a government's use of ICT as a tool, particularly Web-based Internet applications, to enhance the access to and delivery of government information and services to citizens, business partners, employees, other agencies, and entities. An e-government strategy becomes a fundamental element in modernising the public sector, through identifying and developing organisational structure, the ways of interactions with citizens and business, and reducing cost and layers of organisational business processes. It provides a wide variety of information to citizens and businesses through the Internet. However, the role of e-government is not only to provide information and services to citizens, which could be provided by commercial firms. E-government can develop the strategic connection between public sector organisations and their departments, and establish a communication between government levels (e.g. central, city, and local). This connection and communication improve the cooperation between them through facilitating the provision and implementation of government strategies, transactions, and policies, and also better use and running of government processes, information, and resources (Cabinet Office, 2000; Heeks, 2001). Governments can also transfer funds electronically to other governmental agencies or provide information to public employees through an intranet or the Internet. Cabinet Office (2000) and Tyndale (2002) both agree that e-government has improved communication between different parts of governments so that people do not need to ask repeatedly for the same information from different services providers.

Through an integrated web portal, it will be possible for citizens and businesses to complete a transaction with government agencies without having to visit several separate ministries/departments in separate physical locations, which breaks down barriers of geography, demographics and knowledge. In addition, e-government strategy is enabling public sector organisations to interact directly and work better with businesses, irrespective of their locations within the physical world. This includes digitising procurement services from and to businesses in order to improve their service quality, convenience, and cost effectiveness (Heeks, 2001; McClure, 2000).

Accordingly, government leaders and officials are increasingly aware of the potential of e-government to improve the performance of government organisations and provide potential benefits to their citizens and business partners. However, adoption of e-government is not straightforward and cannot be done in a limited period of time, rather it requires an integrative framework approach to place government information and services online. This is one of the reasons why many government organisations are still in the infancy stage of e-government adoption. Another important reason for this delay is that e-government requires significant changes in organisational infrastructure, which, in turn, can engender resistance. For these reasons, the researcher develops an integrative framework for e-government adoption in this study that addresses technological, organisational and environmental perspectives.

1.2 E-government and E-commerce

Some studies used to argue that e-government is defined as e-commerce transactions and both have the same requirements and equivalent in the process of implementation. Figure 1.1 illustrates the major aspects that make e-government different from e-commerce, such as organisational, strategy, motivation, and technical. However, not all the aspects have the same level of differentiation since the organisational aspect is higher than technical, as will be discussed below. IBM group supports this assumption, and emphasises that e-government is about using technology to redefine organisational models in order to extend relevance and maximise value (IBM, 2001). Table 1.1 shows the major differences between e-government and e-commerce as analysed from literature.

In regard to the organisational level, there are differences between private commercial and public sector organisations. Organisation structure, organisational culture, and social norms are examples of major differences (Huang *et al.*, 2002). The complexity of business processes, existing management layers, and boundaries across government bodies make the

implementation process of e-government in the public sector take a long time and pass through complicated stages, especially when the resistance from senior managers to change the way they running traditional businesses turn to be a barrier to adopt new business process or system. Therefore, the strategic framework of e-government adoption and its reflection into government organisation structure is not parallel with adoption of e-commerce in the private sector. In addition, the adoption of e-government initiative should be mandatory rather than voluntary. Janssen and Wagenaar (2002) and Warkentin *et al.* (2002) justified this as citizens and business have to deal with government, and law-abiding citizens have no choice but make tax return through government entities. Hence, government agencies might be required by law to share information with other agencies or citizens.

From a strategic level, in e-government, most business processes have to be seen as individual cases, and in implementation strategy, each case has to be considered on its own and therefore require individual business model and security treatment. On the other hand, in the commercial domain, attempts to optimise and standardise business processes are always based on goals such as cost reduction and benefit increase. Additionally, public administrations compute and process highly sensitive data about individuals and the whole society. This requires a careful investigation and deliberation of security issues before redesigning new business rules. Furthermore, the range of application, of people concerned with, and of data involved is much broader than in the commercial field.

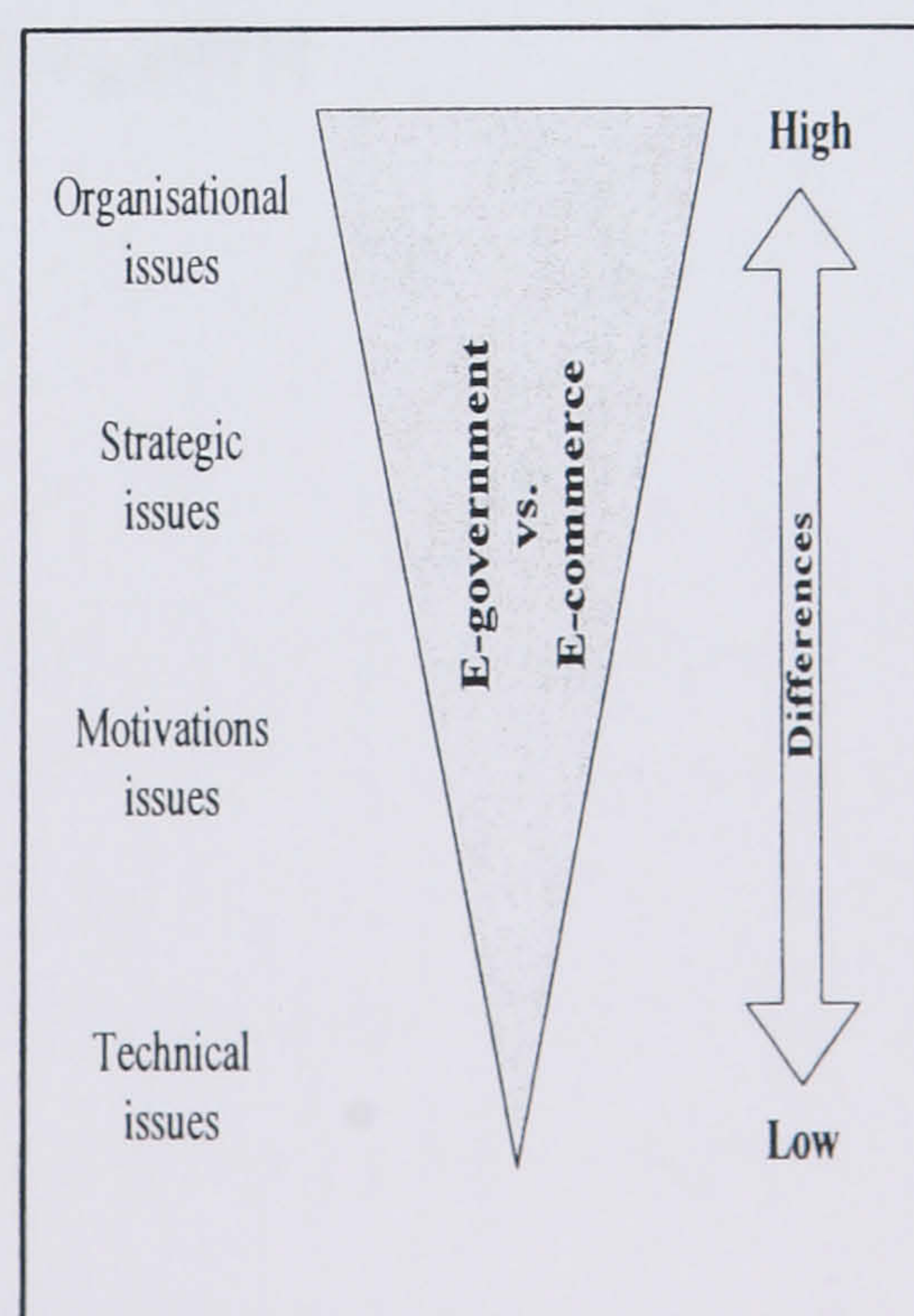


Figure 1.1: Differing aspects between e-government and e-commerce

From a motivation level, e-government is not the same as e-commerce for the reason that, unlike the private sector, the public sector is not driven by profit and competition. Specifically, e-government is designed to provide more cost effective and efficient governmental services to citizens (Huang et al., 2002; James, 2000). Further, in the private sector, the main driver in implementing e-commerce and organisational change is the need for firms to adapt to changing competitive conditions, however, how does this relate to a public sector environment where a competition culture does not exist in many areas of service provision, and what drives organisational change and adopting e-government. Timonen *et al.* (2002) found that the potential of cost saving was not the main driving force behind adoption of e-government. There is a desire to make government more efficient, citizen-oriented, and achieving seamless client-centred service delivery.

From a technical level, the deployment of e-commerce technologies, such as integration tools, middleware technologies, information systems, and security approaches can serve to successfully increase citizens access to information, and improve functioning of the government (Csetenyi, 2000). The characteristics of IT architecture of e-commerce and e-government are the same, and therefore the requirements on e-government enabling infrastructure, which arise from stakeholders' needs and the enabling technologies, are basically the same as for e-commerce (Greunz *et al.*, 2001). However, from the IT perspective, the development and maintenance processes for e-government services' architecture are complicated and difficult, owing to the varied, vast size, the bureaucratic nature of a government, and the complexity of public sector organisation structure. Service requirements must be analysed, involving IT staff, domain experts and administration (Devadoss *et al.*, 2003; Vassilakis *et al.*, 2003).

Dimension	E-government	E-commerce	References
Adoption	Mandatory	Voluntary	Warkentin <i>et al.</i> , 2002
Main Motivations	<ul style="list-style-type: none"> • Cost effective • Improve quality of public services • More citizen-oriented 	<ul style="list-style-type: none"> • Increase revenue • Remain competitive • Enhance marketing 	Huang <i>et al.</i> , 2002; James, 2000
Context	Public sector organisations	Private commercial organisations	Huang <i>et al.</i> , 2002; Warkentin <i>et al.</i> , 2002
Beneficiaries	<ul style="list-style-type: none"> • Citizens • Business • Government employees 	<ul style="list-style-type: none"> • Customers • Businesses • Partners 	Greunz <i>et al.</i> , 2001; Wimmer and Tambouris, 2002
Organisational Structure	Complex structure and bureaucratic	Flexible structure	Vassilakis <i>et al.</i> , 2003
Implementation Process	Time-consuming and complex	Uncomplicated, with specific timeline	Cabinet Office, 2000; Devadoss <i>et al.</i> , 2003; Vassilakis <i>et al.</i> , 2003

Table 1.1: Comparison between E-government and E-commerce

1.3 Justification for Research and Outcomes

The implementation process of e-government in the public sector is moving slowly, and most government organisations are situated between Stages 1 and 2 of implementation, which is mainly providing government information and services without fully end-to-end transactions and integration (Beynon-Davies and Williams, 2003; Hu *et al.*, 2003; Gant and Gant, 2001; Layne and Lee, 2001; Sanchez *et al.*, 2003; Wimmer and Tambouris, 2002). According to the NU/ASPA report on benchmarking e-government in the UN members states, no country, including the U.S., has progressed in its e-government initiatives far enough to reach the fully integrated e-government portal stage (i.e. Stage 4) that is characterised by instant one-stop access to any government services. Further, many government organisations across the world have failed to approach their targets in providing government services electronically by a predetermined deadline. Consequently, many e-government initiatives remain in the early stages, with the capabilities limited to posting simple information on their website (Sanchez *et al.*, 2003). There are many reasons that let government organisations struggle with their e-government projects' implementation. The following points summarises these reasons:

- Many government organisation officials have an incorrect stereotype that e-government is just setting up a server and posting web pages on it. The reason for this

is that there is confusion among these officials about the concept and strategic objectives of e-government adoption, and also there is unawareness in government organisations of the implementation process and critical factors that might influence the adoption.

- Government organisations are struggling with the existing ICT infrastructure, since many of their IS applications are legacy systems and work under a mainframe environment. Also, these IS applications are not compatible with some e-government systems, which make it difficult to interconnect them with front-end applications of the government organisations' website, and hence automate and integrate the latter's business processes.
- Since e-government is a relatively new research area, there is a limited literature analysing its adoption and implementation process, and then there is little understanding of how to improve the success of e-government initiative (Hu *et al.*, 2003; Sanchez *et al.*, 2003). As will be discussed in Chapter 2, the researcher identifies e-government adoption in public sector organisations as an important research issue that has been inadequately studied in the research literature; as a result, there is void of theoretical models for e-government adoption.
- Unlike any IT project, the adoption process of e-government is complex, since it affects several aspects in the public sector and not just the technical architecture. The implementation of e-government in the public sector possesses unique characteristics, particularly with reference to the social, management, business process and political elements inherent in organisational change. The central issue highlighted by Willcocks (1994) is that IT project implementation efforts are often narrowly focused on the installation of technical systems, ignoring the wider organisational aspects. The complex nature of e-government implementation in government has outlined areas in which a multitude of technical, organisational, environmental and potential stakeholders can have impact on the development of public sector services. Many of the challenges faced by governments are organisational issues associated with the introduction of a new IT initiative and its implementation process (Al-Kibisi *et al.*, 2001). Therefore, the need for a comprehensive framework that incorporates a board range of organisational, technical and environmental factors must be considered to support the integrity of the implementation process of e-government.

- There are a number of barriers experienced in public sector organisations that prevent the realisation of anticipated benefits, and degrade successful adoption of e-government projects. These barriers could be unclear or ambiguous for IT managers in government; hence the need for classification of expected barriers that government might encounter becomes essential.

To address the previous issues, this research therefore proposes an integrated framework for e-government adoption, and identifies factors that influence the implementation process in public sector organisations. The proposed framework strategically draws the implementation process of e-government in the form of a stage of growth model. However, the stage of growth model is not sufficient as a model for e-government adoption, and there is a need for another framework that can explain the significant factors that influence the adoption process, and support the implementation of each stage of growth model. Therefore, the researcher integrates the stage of growth model with the primary factors of the Technology-Organisation-Environment framework by Tornatzky and Fleischer (1990), in conjunction with the perceived benefits-barriers model, as Figure 3.1 illustrates. The integration of these literature models (i.e. stage of growth, Technology-Organisation-Environment, and benefits-barriers) may provide a more comprehensive framework for e-government adoption, and therefore benefit information systems research. This framework has been empirically validated and modified as reported in Chapters 5 and 6 across three case organisations located in the Kingdom of Bahrain as multiple case studies, the Central Informatics Organisation (CIO), the Ministry of Social Affairs and Labour (MOLSA), and the Ministry of Commerce (MOC), since they provided sufficient information for this research, and a fourth would not have contributed further significant data, and hence generates a novel conceptual framework for the adoption of e-government that would play a substantial role in the government organisations. The selection of these organisations is based on three different contexts namely, level of interaction (e.g. G-to-G, G-to-B, G-to-C), organisational size (e.g. small, medium, large), and maturity stage of e-government implementation (e.g. stage 1, stage 2, stage 3). Using three different case studies provides more powerful and robust conclusions in this research through confirm the validity of the revised framework in a wide range of government organisations in the Kingdom of Bahrain.

The major role of this framework is to reduce the confusion surrounding the e-government adoption process in the public sector by understanding the implementation process, identifying the requirements of ICT tools, and highlighting the importance of

organisational readiness and the impact of environment. The framework can also help at the decision makers' level to set out a vision statement and strategic action plan for the government future in the information technology age by identifying key factors and stages for action. To support this framework, the researcher develops in Chapter 2 a novel framework for the e-government architecture. This framework demonstrates the technical aspect by describing the ICT infrastructure requirements for the proposed e-government implantation stages, along with the essential business processes in government organisation. Hence, this framework will help IT practitioners in public sector to learn how to use and manage information technologies to revitalise business processes, improve business decision-making, and gain competitive advantage from the adoption of e-government.

In addition, the researcher generates an evaluation framework that can be employed by the government to measure the progress of e-government implementation in its entities. This evaluation framework involves evaluation criteria and parameters that can be used to analyse the contents and functionalities of e-government portals. The proposed framework will allow the IT specialists to understand and evaluate the maturity level of their e-government projects and determine the degree of progress already made.

1.4 Research Aim and Objectives

1.4.1 Research Aim

The rationale of the research presented in this thesis is based on conclusions in the literature that e-government adoption in the public sector has not been given adequate attention, and there are a number of voids which exist in the immature e-government literature regarding its adoption strategy and process (Beynon-Davies and Williams, 2003; Hu *et al.*, 2003; Layne and Lee, 2001; McClure, 2000). This has led to experiences with e-government initiatives in the public sector being unmanageable, and the development of on-line transactional services being in its infant stage, despite recent initiatives on e-government worldwide (Layne and Lee, 2001; McClure, 2000; Stowers, 1999). While there are many emerging programmes and IT projects on e-government throughout the world in all levels of government, the life-cycle of the implementation process has not been comprehensively studied and analysed. This has led to government organisations being exclusively focused on the technical aspect and ignoring other aspects, as IT infrastructures must be built, organisational issues should be resolved in parallel, and cooperation and commitment have to be established. As a result, as discussed in Section 1.3, the framework of the implementation process of e-government is not well

acknowledged, and critical factors that influence the decision-making process in government during the process of e-government adoption have not been identified.

Therefore there is a need to develop a comprehensive frame of reference to help public sector organisations implement e-government. This frame of reference reduces the confusion surrounding the implementation process in the public sector and provides better understanding of aspects related to e-government and their impact on e-government adoption. The proposed frame of reference may also support government organisations that have already proceeded to e-government adoption by allowing them to recognise and evaluate the degree of maturity of their e-government progress. Accordingly, the aim proposed for this research is:

To develop a frame of references that will outline the implementation process of e-government that identifies critical stages of implementation and influential factors which can be used to support the decision process in government organisations.

1.4.2 Research Objectives

In order to address the research aim, the following research objectives will be met:

- To review and analyse the literature in the area of information systems in general, with particular emphasis on literature on e-government adoption and implementation strategies.
- To analyse and identify benefits and barriers of e-government initiative if it is adopted by government organisations.
- To develop a conceptual framework, based on literature review and critical analysis, that can be used to support the adoption of e-government in public sector organisations.
- To test and validate the accuracy of the proposed framework through an empirical study of the experiences of government case organisations:
 - ▣ To sample case organisations that have started the adoption of e-government initiative.

- ▣ To analyse their implementation processes and approaches to identify why, how and what implementation stages have been applied.
- ▣ To register barriers and benefits they experienced while developing e-government projects.
- To revise and develop a frame of reference, based on the empirical work analysis, that can be translated into a strategic framework for e-government adoption and evaluation.

1.5 Dissertation Structure

According to Sekaran (2000), a framework for a research will be passed through multiple phases, somewhat similar to the methodology proposed by Phillips and Pugh (1994). First, background theory, identifying and understanding what is occurring in the area of research, which is the purpose of Chapter 2. Next, developing a conceptual model that will form the basis of the primary research, as presented in focal theory, this is introduced in Chapter 3. Third, data theory that determines and justifies the appropriate research stance, and defines the research methodology and conditions of data collection and units of analysis that facilitate meeting the research objectives constitutes in Chapter 4. Fourth, as reported in Chapter 5, data theory describes also the data collection process through case studies analysis. Chapter 6 then validates the accuracy of the proposed model. Finally, Chapter 7 states the novel contribution of this research which concerns its importance, and provides conclusions and recommendations that could be used for further studies.

Therefore, the overall structure of this thesis consists of seven integrated chapters in which each one discusses a specific issue linked to the objectives stated above. The following paragraphs explain the importance of these chapters.

Chapter 1: Introduction

This chapter introduces the main area of this research by presenting the background to the research topic which is e-government, and then compares the emerging of e-government with e-commerce. The importance of this research and outcomes derived from the

literature investigation are discussed. Thereafter, the aim and objectives of the research are reported along with a brief description of each chapter.

Chapter 2: Literature Review (Background Theory)

The purpose of this chapter is identical to that of the background theory stated by Phillips and Pugh (1994) which is covering the literature survey and reviewing the developments associated with the e-government adoption process in the public sector. The chapter starts by studying the fundamental concepts of e-government such as definitions, motivations, and interaction capacity. This chapter then focuses on the adoption of e-government in the context of public sector organisations, and concludes that there is a limitation in the literature regarding the framework for the e-government adoption process in the public sector. As well, there is a void in the literature in determining the technical and information management infrastructure needed to support the adoption of e-government. As a result, the chapter presents an analysis of ICT requirements and information management models for e-government to propose a novel framework for e-government architecture. The chapter ends by discussing and classifying e-government benefits and barriers.

Chapter 3: Conceptual Framework for E-government Adoption (Focal Theory)

The aim of this chapter is to fill the gap reported in Chapter 2 which is absence of a comprehensive framework for e-government adoption in the public sector. In doing so, the chapter proposes a conceptual framework for e-government adoption that outlines the implementation process, defines critical factors that might influence the adoption process, and identifies the importance of barriers and benefits experienced in the public sector. Due to e-government being a relatively new research area, there was a limited literature analysing its adoption and implementation process, the researcher hence critically reviews the stages of growth model that has been empirically applied to related areas such as e-commerce, web services, and IT adoption, that can be mapped onto e-government adoption. In addition, the researcher goes over IS literature that identify the most significant factors that support the adoption of IT innovations in organisations. Thereafter, a novel framework for the adoption of e-government is developed and analysed. The conceptual framework consists of three parts: stage of growth model, the Technology-Organisation-Environment model, and benefits - barriers model. The proposed model can be used as a decision-making tool to support the government organisation management

when adopting e-government, as well as this framework would be of benefit to researchers to understand the adoption aspect of e-government.

Chapter 4: Research Methodology (Data Theory-A)

In order to achieve the aim and objectives of the research, this chapter portrays the roadmap that should be followed to carry out the research process. It provides the research methodology, research strategies, case study protocol, and units of analysis that are considered to investigate the empirical data. It presents the empirical research design in Figure 6.1 to illustrate the framework followed through the application of the research methodology.

Chapter 5: Case Studies' Analysis and Preliminary Research Findings (Data Theory-B)

This chapter describes and analyses empirical data that are used to test and validate the proposed theoretical model for the adoption of e-government. It offers an empirical analysis of different case studies' perspectives on three major aspects of this research: IT infrastructure, organisational behaviour towards the adoption of the implementation process, and benefits and barriers in the adoption of e-government. The outcomes of these case studies suggest some modifications for the proposed conceptual model, such as incorporating new factors that influence the implementation process of e-government and restructuring the stage of growth model.

Chapter 6: Revision and Validation of Conceptual Framework for E-government Adoption (Novel Contribution-A)

According to the empirical data derived from the analysis of case organisations presented in Chapter 5, this chapter revises the proposed conceptual framework and considers suggested modifications, such as restructuring the stage of growth model and generating new influential factors.

Chapter 7: Conclusions and Recommendations for Future Research (Novel Contribution-B)

The aim of this chapter is to summarise the main findings and conclusions derived from this research, and thus the novel contributions are discussed. In addition, it presents research recommendations that can benefit government organisations, and also reports the limitations of the research process. Finally, the chapter provides critical recommendations for further research in the e-government area.

Chapter 2

Literature Review

This chapter offers a detailed review and critical analysis of normative literature on e-government adoption in public sector. It attempts to build a background of the e-government context to be used as a support the implementation of this research, especially building a conceptual framework for e-government adoption in Chapter 3. Since e-government initiative is a wide-scale strategy that affects many aspects, this chapter, based on literature analysis, identifies different perspectives that describe e-government by providing a number of definitions that explain the concept of e-government at the beginning of the chapter. Then the chapter reviews the reasons that lead public sector organisations to adopt e-government by presenting the motivations and objectives of e-government implementation. As e-government is an emerging research area, there is a limitation in the literature addressing the adoption process of e-government in the public sector. Therefore, the researcher develops a framework for e-government architecture that will provide better understanding of the e-government infrastructure and implementation process in the public sector, and also support the generation of the proposed conceptual framework for e-government adoption in Chapter 3. Finally, the chapter discusses and classifies benefits and barriers of e-government that play an important role in the proposed conceptual framework.

2.1 Introduction

The aim of this chapter is to present a significant review of e-government initiative literature. It also provides some critical classifications that illustrate a clear analysis of e-government, such as classification of electronic interaction of e-government with distinct sectors, classification of computer applications and systems that play an important role in e-government implementation, and classification of e-government benefits that promote e-government adoption, and barriers that could prevent a public sector organisation adopting e-government successfully.

At the beginning of this chapter, the researcher presents definitions of e-government from different perspectives. In Section 2.3, the researcher describes the potential of adoption of e-government initiative for public sector organisations, and categorises the motivations into organisational, technical, partnership, financial, coordination, and strategic.

Section 2.4 presents the classifications of electronic interaction of e-government with other community sectors. Following the literature review, four types of interactions are proposed: (1) government-to-citizen, (2) government-to-business, (3) government-to-government, and (4) government-to-employees. The researcher discusses the nature and expectations of these sectors and also the essential requirements for establishing this electronic interaction.

Section 2.5 introduces the e-government dimensions, and categorises them into 6 e-initiatives: (1) e-business, (2) e-commerce, (3) e-democracy, (4) e-voting, (5) e-services, and (6) e-procurement, which play an important role in modernising government process and strategy, and strengthen e-government efficiency and effectiveness.

Section 2.6 develops a novel framework of e-government architecture that identifies ICT infrastructure, organisational requirements and business models. Since e-government is a relatively new research area, its architecture and adoption strategy have not been widely discussed in the literature. Therefore the researcher reviews and studies these concepts from other relevant areas such as e-business and e-commerce. Based on literature analysis, the researcher concludes that the architecture of e-government is divided into 4 layers: (1) access layer, (2) e-government layer, (3) e-business layer, and (d) infrastructure layer. The researcher defines and discusses the characteristics and requirements of each layer. In particular, applications, tools and infrastructure technologies that are used to exchange data and applications services between different organisations and also support government

services and transactions. They are classified in order to give a clear picture of e-government requirements prior to the decision on adoption.

Sections 2.7 and 2.8 analyse and classify the benefits and barriers to e-government adoption experienced in public sector organisations. Since organisations face potential barriers before and during the adoption process, this section addresses 5 dimensions of barriers that have been discussed in the literature and experienced by organisations while adopting e-government and similar technologies. The researcher categorises them into: (1) IT infrastructure, (2) security and privacy, (3) IT skills, (4) organisational issues, and (5) financial resources. These sections allow the reader to recognise and understand how such barriers could prevent the anticipated benefits of e-government projects, and degrade the level of their successful implementation.

2.2 Electronic Government Definition

E-government is still an exploratory knowledge area and consequently it is difficult to define e-government accurately, since e-government encompasses a broad spectrum (Hu *et al.*, 2003; Joia, 2004; Sanchez *et al.*, 2003). As a result, there is no standard single definition for e-government that can encapsulate exactly what e-government really represents. In the existing literature, there are a number of definitions which attempt to explain the concept of e-government according to their scope and perspectives. Therefore, analysis is established in this section to classify different definitions of e-government according to the represented domain.

▣ **Public administration domain.** E-government has been defined as using the application of information and communications technology (ICT) to innovate and modernise the field of public administration through streamlining public management procedures, reducing organisation layers, and introducing business process reengineering, which in turn facilitate the daily administration of government. E-government is viewed as a viable solution to many problems that government administrations have experienced, such as inefficient operations, slow services, bureaucracy, and lack of accountability (Sanchez *et al.*, 2003; Tambouris *et al.*, 2001; Wimmer, 2002).

- ▣ **Technological domain.** Bellamy (1998), Beynon-Davies and Williams (2003), National Research Council (2002), and Tambouris *et al.* (2001) explain e-government as the use by government agencies of Internet-based technologies, security techniques, and network and communication infrastructure that have the ability to transform the effectiveness, security and accountability of informational and transactional exchanges within government and between citizens, business and other arms of government. These technologies can serve a variety of different ends, such as improved interactions with business and industry and more efficient government management and resulting benefits which can be less corruption, increased transparency, greater convenience, revenue growth, and cost reduction.

- ▣ **Business domain.** Wassenaar (2000, p.289) defines e-government as “ *The application of ICT to improve, transform and redefine any form of resource and information exchange (transacting and contracting) between involved actors like companies and governmental agencies and their customers, suppliers, or other partners by developing and maintaining dedicated inter-organisational systems, virtual organisational arrangements and (inter) national institutional arrangements* “.

- ▣ **Political domain.** Baker and Panagopoulos (2004) and Fletcher (2004) define e-government as their political perspective, where e-government represents a new policy opportunity for governments in that they can present new channels for citizen participation and a solution for local government to address complaints. In doing so, e-government transforms the citizens’ relationships with their government, and facilitates governance which meets around issues of democracy, politics, and interaction with elected officials.

- ▣ **Managerial domain.** E-government is not just about putting existing forms and services online. It provides the opportunity to evaluate the management processes of government organisation, rethink how government provides services, how it links these services in a way that is tailored to users’ needs, and ultimately be able to incorporate governance itself and shift the way political and social power are organised and used (Burn and Robins, 2003; Harries, 2000).

According to the above definitions of e-government that represent several domains, the researcher concludes that the definition of e-government stated in Chapter 1 can be developed to include other aspects. Hence, e-government represents a wide scale strategy that affects many aspects of the government arena, in which beside the delivery of government information and services electronically to constituents by using ICT, e-government is the central ring linking the technology, business, policy, management and strategy so as to provide effective government services through modernising the structure of public sector organisations, streamlining their business processes and reducing organisational layers. This will shrink the boundaries across government organisations, increase the availability and transparency of government information, and speed up the decision-making process within government organisations. Therefore, the successful adoption of an effective e-government is directly dependent on organisational change.

2.3 Motivations for E-Government Adoption

According to the previous section, the various definitions of e-government briefly indicate that there are a number of factors which lead the public sector to adopt e-government. In order to understand the reasons behind the adoption of e-government, these factors have been reviewed and analysed to represent the motivations towards the adoption of e-government in public sector organisations. Therefore, the researcher categorises the motivations into different perspectives to make better identification: financial, technical, partnership, organisational, coordination, and strategic.

- ▣ **Financial motivation.** As with any IT project implementation, public sector organisations seek to reduce operational costs to improve their financial situation. Implementing e-government projects, in particular, tends to reduce operational costs and make revenues go further, since government services and transactions are delivered through the Internet which reduces work processes oriented towards paper handling and manual control (Carbo and Williams, 2004; Duffy, 2000; James, 2000; Moon, 2002; Sanchez *et al.*, 2003). In addition, governments are the largest buyers in the market. U.S. spending on materials and services in 2000 was around \$550 billion, and European Union member states' combined procurement spending was around \$778 billion. The online procurement can save from 20% to 50% in the cost of materials and services, with corresponding savings for the suppliers, who do not need to set up a website; all that is needed is Internet access (Beynon-Davies and Williams, 2003; Burn and Robbins, 2001). Daniels (2002) and Seifert and Petersen (2002) suggest that full

deployment of government level connections will result in easier, more flexible and reliable access to government data, as well as improve the management of government IT resources. This should result in hundreds of millions of dollars saved annually by eliminating redundant data collection, increasing the speed of transactions, improving the consistency of outcomes, and increasing opportunities for cost-sharing partnership.

- ▣ **Technical motivation.** Government organisations are significantly behind in their exploitation of ICT for supporting organisational activity compared to private sector organisations (Beynon-Davies and Williams, 2003; Sanchez *et al.*, 2003). Atkinson and Ulevich (2000) argue that governments at all levels (i.e. central, city, and local) must enhance and update their own internal computer systems and communications before applying electronic transactions with citizens and businesses. Hence, adopting e-government in a public sector organisation can lead to widespread improvement in ICT architecture. Since a public sector organisation consists of functional departments, each of which could perform its business process either manually or in an independent system, the role of ICT is thus to improve the communication in an organisation, automate the business process, and integrate the different applications and systems to improve the decision-making process.
- ▣ **Partnership motivation.** Public sector organisations seek to improve the ways of dealing with external partners, such as business and industry. The most valued business expected from e-government is to be able to comply with government regulations in a fast and cost-effective way. E-government enables government organisations to interact directly and work better with businesses, irrespective of their locations within the physical world. This includes digitising procurement services from and to businesses through use of a single electronic web site that enables contractors to easily access the specifications which they need to submit bids. E-procurement is an interesting proposition for public organisations and, more generally, to promote electronic commerce in a country. This turns to improve the quality of purchasing, reduce purchasing time, and increase convenience and cost-effectiveness (Carbo and Williams, 2004; Heeks, 2001; Joia, 2004; McClure, 2000).
- ▣ **Organisational motivation.** The e-government strategy is a fundamental element in modernising the structure of public sector organisations, and it identifies and develops a common framework and direction for change across them (Tyndale, 2002). E-

government initiatives propose to enhance efficiency of government organisations, improve the quality of government organisation services through quicker and reliable transactions, improve accountability, improve the cooperation between departments, overcome bureaucracy, increase transparency, provide better business processes, and create new services (Heeks, 2001; James, 2000; Ma *et al.*, 2005; Seifert and Petersen, 2002; Timonen *et al.*, 2002).

- ▣ **Coordination motivation.** Traditionally, government employees experience poor coordination and cooperation between and within government organisations, because of the separatism which exists in information distribution at different levels, which delays their administrative operations and decision-making process. Some branches of government may have the power to control or block certain information so it can not be transmitted (Hu *et al.*, 2003). Adoption of e-government can make strategic connections within arms, organisations, levels and data stores of government, which strengthen government capacity by integrating data, information and knowledge across employees, departments and locations. In addition, this connection facilitates the provision of the strategy and policy of government processes and better use of resources, as well as providing effective running of government information and services. As a result, this electronic connection between departments and organisations tends to quicker decision making, and supports integrity of decisions by making employees work as one team (Cabinet Office, 2000; Heeks, 2001; Sanchez *et al.*, 2003). Cabinet Office (2000) and Tyndale (2002) both agree that government organisations should be motivated to adopt e-government to improve communication between them, since it enhances coordination, streamlines business processes, and increases consistency of outcomes. This connection can also transfer funds, payments, reports, and documents electronically to other governmental agencies, or provide information to public employees through an intranet or Internet (Sanchez *et al.*, 2003).
- ▣ **Strategic motivation.** Under e-government strategy, public sector organisations will be able to transform from a traditional bureaucratic paradigm to an e-government paradigm to fully automate their business processes and reform the organisational structure. Table 2.1 shows the expected strategic changes proposed by Ho (2002) that take place in public sector organisations when shifting from the traditional to the e-government paradigm.

Perspectives	Traditional Paradigm	E-government Paradigm
Orientation	Production cost-efficiency	User satisfaction and control
Process organisation	Functional rationality, departmentalisation, vertical hierarchy of control	Horizontal hierarchy, network organisation, information sharing
Management	Management by rule and mandate	Flexible management, interdepartmental team work with central coordination
Leadership	Command and control	Facilitation and coordination among parties, innovate entrepreneurship
Internal communication	Top-down, hierarchical	Multidirectional network with central coordination, direct communication
External communication	Centralised, formal, limited channels	Formal and informal, direct and fast feedback, multiple channels
Service delivery	Documentary mode, interpersonal interaction	Electronic exchange, non-face-to-face interaction

Table 2.1: Strategic Effects of Move from Traditional Paradigm to E-government Paradigm

2.4 Classification of E-Government Interaction

Successful adoption and implementation of e-government will increase the capacity of government interaction and communication with community sectors. The result is to create a large online community of government, business and citizens, which automates the delivery of government information and services and digitises processes of interaction within and between governments.

A number of studies discuss the efficiency and effectiveness of electronic interaction between government and distinct sectors. Some of these propose three types of interaction (e.g. Bonham *et al.*, 2001; Seifert and Petersen, 2002), such as government-to-citizen, government-to-business, and government-to-government. Others propose four types of interaction (e.g. Daniels, 2002; Wiskott, 2002), whose fourth type is government-to-employees. Most studies, such as Bonham *et al.* (2001), Daniels (2002), Heeks (2000), NECCC (2000), Seifert and Petersen (2002), and Wiskott (2002), agree that communication and interaction of government with other community sectors play a major role in the e-government implementation process, and government organisations should thus take into account those sectors while implementing e-government. In this section, the researcher discusses the four types of interactions between government and all distinct sectors, which have their own nature, objectives and requirements. Figure 2.1 depicts the interaction of a government organisation with four distinct sectors.

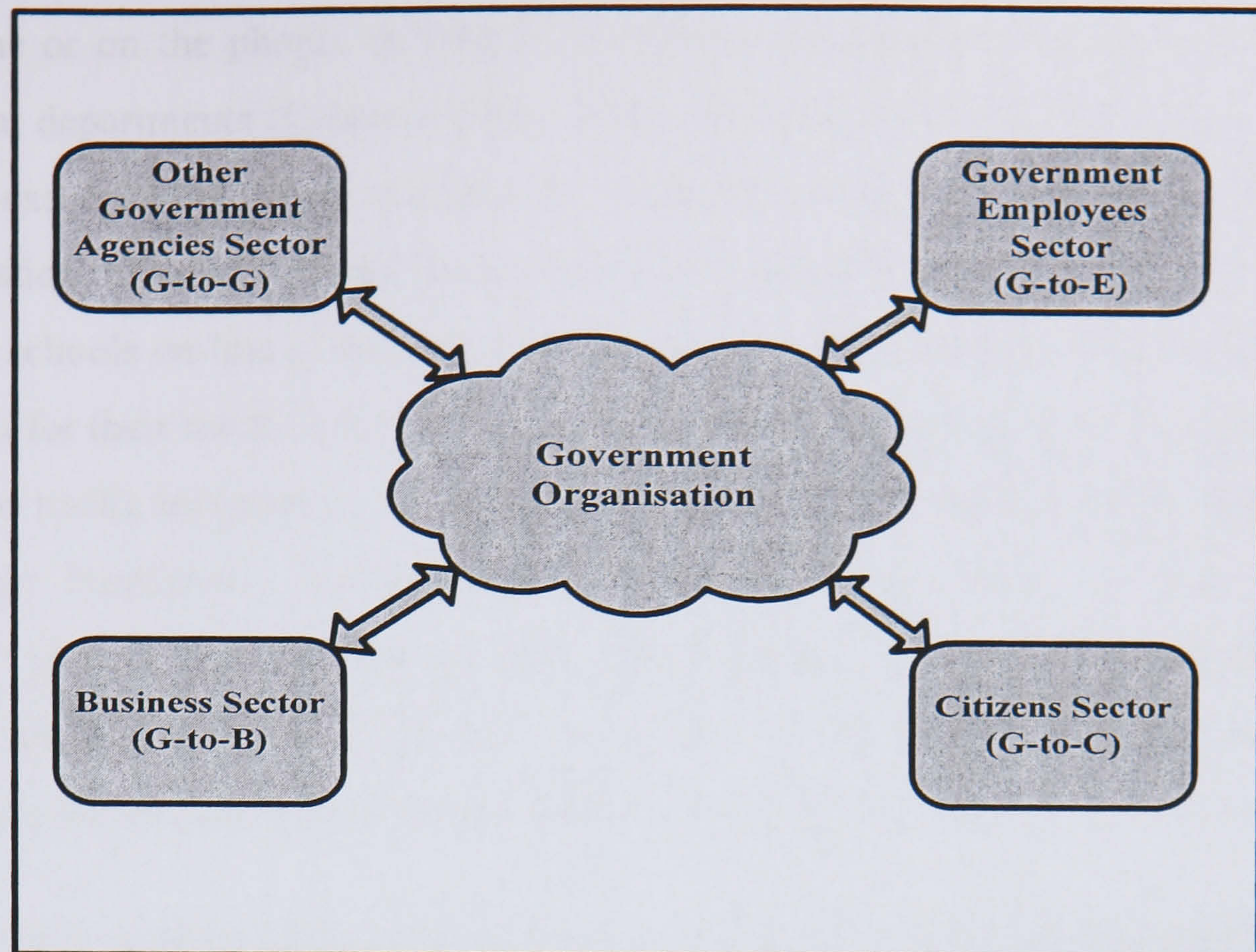


Figure 2.1: E-government Interaction with Community Sectors

2.4.1 Government to Citizen (G-to-C)

Bonham *et al.* (2001) describe G-to-C as designed to facilitate citizen interaction with government, which is what some authors perceive to be the primary goal of e-government (Fletcher, 2004; Ni and Ho, 2005; Scott *et al.*, 2004). The objective of this type of interaction is to attempt generate a single portal which integrates internal and external sources of information systems through a simpler and more user-friendly site. It leads to reducing search time, providing access any time, and offering better government services to citizens (Bonham *et al.*, 2001; Heeks, 2000; Seifert and Petersen, 2002). Thus the value of G-to-C will: *“..increase through more detailed information and the ability to conduct transactions online. Citizens will be able to find information and conduct transactions at a single site, rather than searching through multiple agency web sites. It will add value to government agencies, which will reduce the duplication of services to citizens, increase sales and employee timesaving”* (Daniels, 2002, p.26). The latter study concludes that the development of the G-to-C approach will save federal agencies in the USA approximately 5 million dollars annually, because it reduces communication cost, expenditures, and staff in organisations.

Citizens used to complain about the complexity of government procedures due to the time-consuming waiting for a certain service, unavailability of relevant working papers, and unawareness of transactions steps. Since e-government enables citizen to have all relevant information and advice at hand in a one-stop online shopping site, there are no more long

waits in line or on the phone, no delays in answers, no struggling around for approvals from several departments (Cabinet Office, 2000; Wimmer and Tambouris, 2002; Wiskott, 2002). For example, taxpayers will have the ability to choose how, when, and where they get information, file returns, and make payments; parents and students will be able to register for schools on-line at their own convenience, and it will be possible to evaluate the best schools for their needs and aspirations directly, as well as to apply for available grants; personalised traffic information and recommendations will be available when people need it to reduce frustrations. Further, citizens expect to have access to their personal information and provide updates as their life develops. For example, register births, marriages, death, and moves, and their own data would follow them and be readily available for personalised governmental interactions (Wiskott, 2002).

In order to meet these facilities and expectations of G-to-C, government organisations must be equipped with reliable and efficient ICT applications and tools. For example, their systems must be 'Internet-aware', that is, the database management system supporting information and services must be compatible with the Internet (i.e. web-enabled applications). This is achieved by using object-oriented programming languages and a filing system that supports a search through unstructured data such as web documents and XML (Bandyo-padhyay, 2002). As well as this, the government web site should be maintained periodically to keep citizens up to date with new information, policies and procedures. However, G-to-C interaction exposes citizens to unique threats to data privacy and security of their information that makes them less convinced to access government sites, and affects their trust in e-government. Security is one of the most important issues in the e-government adoption process. It is the organisations' responsibility to ensure that a citizen's transaction is based on confidentiality, privacy, and authorisation manner (Gefen *et al.*, 2002). Further, another important issue surrounding the G-to-C approach that should be given special attention is digital divide. Inequality of access to personal computers and, consequently, of access to government information through the Internet is still significant (Beynon-Davies, 2005). The problem of digital divide is not simply an economic gap between the 'haves' and 'have-nots'. It is a multidimensional policy challenge that is influenced by economic factors, as well as technological and social factors (Ni and Ho, 2005). For example, to have access to e-government by citizens from home needs an ICT infrastructure in place first, such as personal computer, Internet connection, and essential software, and then requires skills of how to use computer applications and the Internet. Moreover, social factors play an important role here, such as school leavers, poor citizens,

different language, ethnic minority, rural citizens, and elderly citizens (Bonham *et al.*, 2001; Heeks, 2000).

2.4.2 Government to Business (G-to-B)

The Daniels (2002) describes G-to-B as designed to facilitate clear communication between government sectors and business companies. The G-to-B interaction has received a significant amount of attention in government, since businesses are suppliers to, partners of, customers of, and occasionally competitors with, government (NECCC, 2000).

There are two primary forces driving the G-to-B interaction. The first is the business community. Once government is able to deal directly online with business, application and renewal of business licences and permits, sales and other activities will be carried out directly on-line, along with tailored advice and immediate response. Also, companies will be able to comply with social taxes and allocations management and payments automatically, with direct links between their Human Resource IT systems and the Government infrastructure (Seifert and Petersen, 2002; Wiskott, 2002). This will streamline business processes and reduce barriers between government and businesses, which in turn will increase investments and economic growth in the country. The second force is the growing demand by policymakers for cost-cutting and more efficient procurement. Since governments are often the largest purchaser of goods and services, electronic procurement will allow governments to act as market makers. They will be able to promote regional supply and demand substantially, besides ensuring best prices for themselves (Bonham *et al.*, 2001; Cabinet Office, 2000; Wiskott, 2002). In addition, it provides access to the rulemaking process any time, anywhere, and creates a more collaborative manner in which to improve the quality of policy decision-making, and make policy and public safety decisions. It also makes processes clearer, fast, reliable, and automated (McClure, 2000; Seifert and Petersen, 2002).

Most studies claim that this interaction is still at an early stage, and some government sites have not implemented what business expected from them. The reason for this is that the public sector experienced lack of necessary IT applications and integration technologies that allow organisations to connect seamlessly with their partners (This point will be addressed in Section 2.6). Therefore, government organisations should be aware of the interaction with the business sector when adopting e-government, and not concentrate only on citizen interaction, since value business that invest in the country expected from e-

government is to be able to comply with government regulations in a fast and cost-effective way (Bonham *et al.*, 2001).

2.4.3 Government to Government (G-to-G)

The successful adoption of e-government should involve the G-to-G electronic interaction which is derived from collaboration, aggregation, knowledge exchange, and secure information transformation among government organisations.

In the business sector, when all the tasks and procedures of an undertaking are centralised in a single company, it is simpler to organise and assess knowledge accrued from a project. Government can be said to be similar to business in terms of significance of knowledge sharing and processes integration, since government is a collection of public agencies, each of them having its own information and knowledge. Hence there is a need to ensure that agencies are linked so as to share their explicit knowledge and integrate their processes. In doing so, government organisations' databases systems should be connected and shared by all departments and government organisations to enable electronic processes between them and conducting electronic exchanges between government levels, which provide access to the government data in a single location

In a recent study, Joia (2004) has considered three parameters to establish the background of the G-to-G approach, namely connectivity, sharing, and structuring. The connectivity issue addresses the degree of penetration of the metabusiness. It represents how the public agencies involved are linked within the metabusiness in such a way as to transmit data and information among themselves. The sharing issue addresses the degree of scope of the metabusiness which is the type of transactions developed within the metabusiness and the way the public agencies are working together in a workgroup environment. Finally, the structuring issue deals with the ability that the public agencies possess for extracting useful knowledge from the data and information retrieved and shared by them. Joia (2004) has emphasised that these parameters are integrated, and hence any attempts to implement G-to-G applications without connectivity will result in no sharing. As well, no structuring can exist without sharing, and no organisational intelligence will be created without structuring

G-to-G interaction supports the transformation of physical inter-business operations into a network of information-based activities, thus improving the transparency of business functions, and therefore the efficiency of transactions and communications between

government levels, which is called vertical integration (Atkinson and Ulevich, 2000; Bandyo-padhyay, 2002). This efficiency will be reflected also to the citizen when a citizen conducts a transaction with the central government, the transaction information will be propagated to the local government agency counterparts. These various levels of systems are connected and talk to each other, so that results of transactions from one system can be interchanged with another (Layne and Lee, 2001; NECCC, 2000; Seifert and Petersen, 2002). For example, a business must obtain both a local and a central business licence, so a citizen would file for a business licence at the local government transaction server, and the local server, by accessing the central database, would check the central database, retrieve corresponding records, propagate changes, and calculate the total licence fee. The central database could also check licensees to make sure locally-licensed companies also had a central licence (Layne and Lee, 2001). Daniels (2002) and Seifert and Petersen (2002) conclude that full deployment of government level connections will result in easier, more flexible and reliable access to government data, as well as improve the management of government IT resources.

From the analysis of G-to-G requirements performed by Loukis and Kokolakis (2003), they conclude that government organisations should be equipped with an integrated architecture for a collaborative environment that should be capable to support G-to-G collaboration. Therefore, the researcher developed a novel framework for e-government architecture that will facilitate the implementation process of G-to-G which is presented in Section 2.6. Loukis and Kokolakis (2003), in their study, identify some of critical IS components that might help build the G-to-G architecture:

- Workflow management system,
- Document management system,
- Content management system,
- Intelligent agents (for search, meetings, planning, scheduling, etc.),
- Knowledge management system,
- Database management system,
- Billing and Payment systems,
- Electronic consultation tool, and
- Electronic forms system. (Most of these components will be described in Section 2.6.3 when discussing the architecture of e-government)

However, the G-to-G approach in public administration is still in its infancy stage due to an inadequate technical infrastructure. These systems require widespread use of integration applications in order to leverage of all existing systems and databases belonging to all other organisations by letting them communicate seamlessly in support of business purposes (Bandyo-padhyay, 2002). Such applications are ERP and EAI, which are designated to integrate disparate systems of all the businesses, and these technologies will be involved in Section 2.6.3. In addition, security is a key factor in G-to-G interaction, as the harm by flaws in the new processes deployed can damage not only the connected public agencies, but also society as a whole (Joia, 2004). As a result, the G-to-G process must present a high level of security, as public agencies should incorporate security technologies in their infrastructure, such as proxy servers, firewalls and intrusion detection systems that are necessary to deploy G-to-G enterprise successfully.

2.4.4 Government to Employees (G-to-E)

Bonham *et al.* (2001) and Wiskott (2002) describe G-to-E as designed to facilitate better understanding by employees of government laws, regulations, and procedures, as well as empowering employees to assist citizens in the fastest and most appropriate way. The value of G-to-E interaction will be vital in government when speeding up administration processes, improving the consistency of procedures, reducing transaction time, optimising government solutions, and reducing the number of employees necessary to complete a task.

Traditionally, government employees are experiencing slow delivery of required information from another department or organisation due to the separation of systems and disconnection of organisation databases. Thus, there is a need for a networking infrastructure that connects organisations and their departments. Government can effectively use an intranet and extranet (see Table 2.4), which enable employees to interact efficiently with other departments and agencies concerning human resource information, retirement, and latest news releases, drawing on the available resources in an optimal way, and using the most appropriate support, and other employee-related issues (NECCC, 2000; Wiskott, 2002).

In addition, as a part of e-government adoption, successful implementation of this interaction will maintain internal procedures and compliance guidelines and rules in one place and available directly; this ensures up-to-date information at all times. All personal

workforce information such as name, phone, location, marital status, children, salary, and pension plan situation will be accessible by the employee, so that latest statuses can be checked and mistakes corrected as necessary (Bonham *et al.*, 2001; Wiskott, 2002).

2.5 E-government Dimensions

From the previous sections, the researcher concludes that the adoption of e-government is much more than gathering information, downloading files, or making online transactions. E-government can include all information and communications technologies to support inter-government operations and activities, focus onto citizens, and provide government services to all parts of the community. In that way, a broader approach embraces the whole range of governance and administrative projects, including other dimensions and activities such as e-services, e-democracy, e-voting, e-procurement and e-commerce (Sakowicz, 2003). The researcher understands that adopters of e-government should not focus on e-government adoption as information delivery only, rather it is just the beginning of a roadmap, and these dimensions should be part of e-government roadmap strategy. Therefore, we cannot discuss e-government adoption without stopping at these dimensions in view of the important role that they play in modernising the government process and strengthening e-government efficiency and effectiveness. Therefore, this section investigates these dimensions and presents them in Table 2.2, which introduces the significant part they are playing in e-government.

Dimension	Description	Characteristics	References
E-business	Practice of modernising, integrating and coordinating business systems, processes, organisations, and value chains within government using computer Internet-based and related information technologies. E-business facilitates support of business processes and relationships between government partners, employees and citizens.	<ul style="list-style-type: none"> ▪ Improves internal communication and coordination ▪ Creates strategic electronic links within supply chain for better productions ▪ Speeds up business processes 	Chesher <i>et al.</i> (2003) Schubert and Hausler (2001) Stanoevska-Slabeva (2003)
E-commerce	Subset of E-business and it concerns use of Internet and other ICT for marketing, transacting of products and services.	<ul style="list-style-type: none"> ▪ Enhances both organisational efficiency and effectiveness ▪ Offers digital products and services ▪ Collects and disseminates market information throughout organisation ▪ Streamlines organisation business processes 	Chang <i>et al.</i> (2003) Chesher <i>et al.</i> (2003) Sakowicz (2003) Schubert and Hausler (2001) Stanoevska-Slabeva (2003)
E-democracy	Refers to activities that increase citizen participation in political environment, including virtual town meeting, open meeting, cyber campaigns, feedback polls, addressing complaints, public surveys and community forums (such as through e-voting and e-consultation)	<ul style="list-style-type: none"> ▪ Consultation with local authorities. ▪ Direct democratic participation in policy making. ▪ Makes elected officials more accountable to public. ▪ Participates in policies' implementation. ▪ Expands policy deliberation 	Bouras <i>et al.</i> (2003) Greunz <i>et al.</i> (2001) Sakowicz (2003)
E-voting	Part of e-democracy arena that increase political involvement through election system that uses electronic ballots that allow voters to transmit their vote to election officials over Internet	<ul style="list-style-type: none"> ▪ Provides source system for conducting electronic votes. ▪ Permits only eligible voters to vote ▪ Increase election participation rate ▪ Ensures each eligible voter can vote only once. 	Bouras <i>et al.</i> (2003) Greunz <i>et al.</i> (2001)
E-procurement	Electronic procurement support of procurement processes such as government-to-business purchase, request, tendering authorisation, ordering, delivery and payment of supplies and services over the Internet	<ul style="list-style-type: none"> ▪ Allowing automated buying and selling process, aggregates purchasing function across both agency departments and public sector entities. ▪ Inventory and catalogue management ▪ Controls financial and payment processing 	Cabinet Office (2000), Morris (2002) Singh (2002)
E-services	Usually it refers to Electronic Service Delivery (ESD) that uses electronic delivery via Internet for government and business information, programmes, business processes, computing resources, applications, and strategies.	<ul style="list-style-type: none"> ▪ One-stop services centres ▪ Strengths customer-service provider relations ▪ Creates transactional efficiencies ▪ Offers services that demonstrate serious valuation of citizens as customers of administration 	Featherman and Pavlou (2003) Sakowicz (2003)

Table 2.2: E-government Dimensions

2.6 E-government Architecture Framework

Since the aim of this research is to develop a framework for e-government adoption, there is a need for a supportive framework that can reduce the confusion surrounding the e-government implementation process in the public sector. Especially, e-government is an emerging research area, and there is limited literature analysing e-government integrative infrastructure. Therefore, the researcher develops an architecture framework for e-government adoption that will reduce the confusion surrounding the e-government infrastructure in the public sector by understanding the implementation process, identifying the requirements of ICT tools, highlighting the importance of organisational management resources and the impact of the business management model, which are crucial for developing the framework for e-government adoption. The framework can also help the decision makers' level to set a vision statement and strategic action plan for government future in the information technology age by identifying key elements and stages for action.

A public sector organisation planning to adopt an e-government initiative and formulate its IT strategies must evaluate its business models and select appropriate technology solutions that deliver on central government policy. Although there are significant differences in the composition of organisations, there are a number of technologies and systems infrastructure that many organisations need to adopt in common to provide facilities for the integration of their systems in a way that enables them to build a platform for sharing their knowledge resources. For example, an e-government portal requires a common and integrated architecture framework that allows different organisations, provinces, and municipalities to share and exchange data, independent of formats, devices and underlying architecture (Sharma and Gupta, 2002). Therefore, the researcher attempted to have a clear understating of architecture frameworks from both the technical and the information management level.

The e-government architecture defines the standards, infrastructure components, applications, technologies, business model and guidelines for electronic commerce among and between organisations that facilitate the interaction of the government and promotes group productivity. Since e-government is a relatively new research area, its architecture and adoption strategy have not been widely discussed in the literature. Therefore, the researcher reviews and studies these concepts from other relevant areas such as e-business, e-services, and e-commerce. Notwithstanding, a number of studies have discussed the

architecture or components of e-government, such as Cabinet Office (2000), Daniels (2002), Heeks (2001), Office of Information Technology (2001), and Sharma and Gupta (2002). However, these studies did not address the aspect of the business management model and how it is aligned with IT infrastructure in the public sector. Since e-government goes beyond the IT infrastructure to organisational routines and processes, the contribution of this section is to provide an integrated architecture framework for e-government that represents the alignment of IT infrastructure with business process management in public sector organisations. During the development of this framework, the researcher will discuss the required business process for the successful implementation and management of e-government activities. In doing so, the researcher develops the framework architecture to incorporate it with integration applications and tools. The reason for this is that they already play a significant role in enhancing business process within organisations and their applications, such as e-business, e-commerce, EAI, web services, etc., so their inclusion was considered necessary. The significance of integration technologies has been discussed and classified under the e-business layer section, since many technologies and approaches that should be used in e-government projects are designed to support e-business and e-commerce applications in private sector organisations. Figure 2.3 shows the framework is structured into four layers (access, e-government, e-business and infrastructure layer), connected by two-directional arrows which present the hierarchical level of e-government implementation and portray the logical connection of each relevant layer that allows two-way transmission of data and services. The top level of the framework represents the access layer and illustrates who might use the government services and what the channels of access are. Through these channels, the e-government portal should integrate all government information and services from disparate departments and organisations, which constitutes the e-government layer. In connected to the e-government layer, the e-business layer is designed to manipulate and integrate government data sources across government bodies, and make information and services available to the e-government portal in real time. At the bottom level of the framework, the ICT infrastructure layer of e-government is built to reach out to all parts of government, and hence support the e-government operations and provide effective and reliable e-government services. This section now discusses the architecture that forms the framework of e-government architecture.

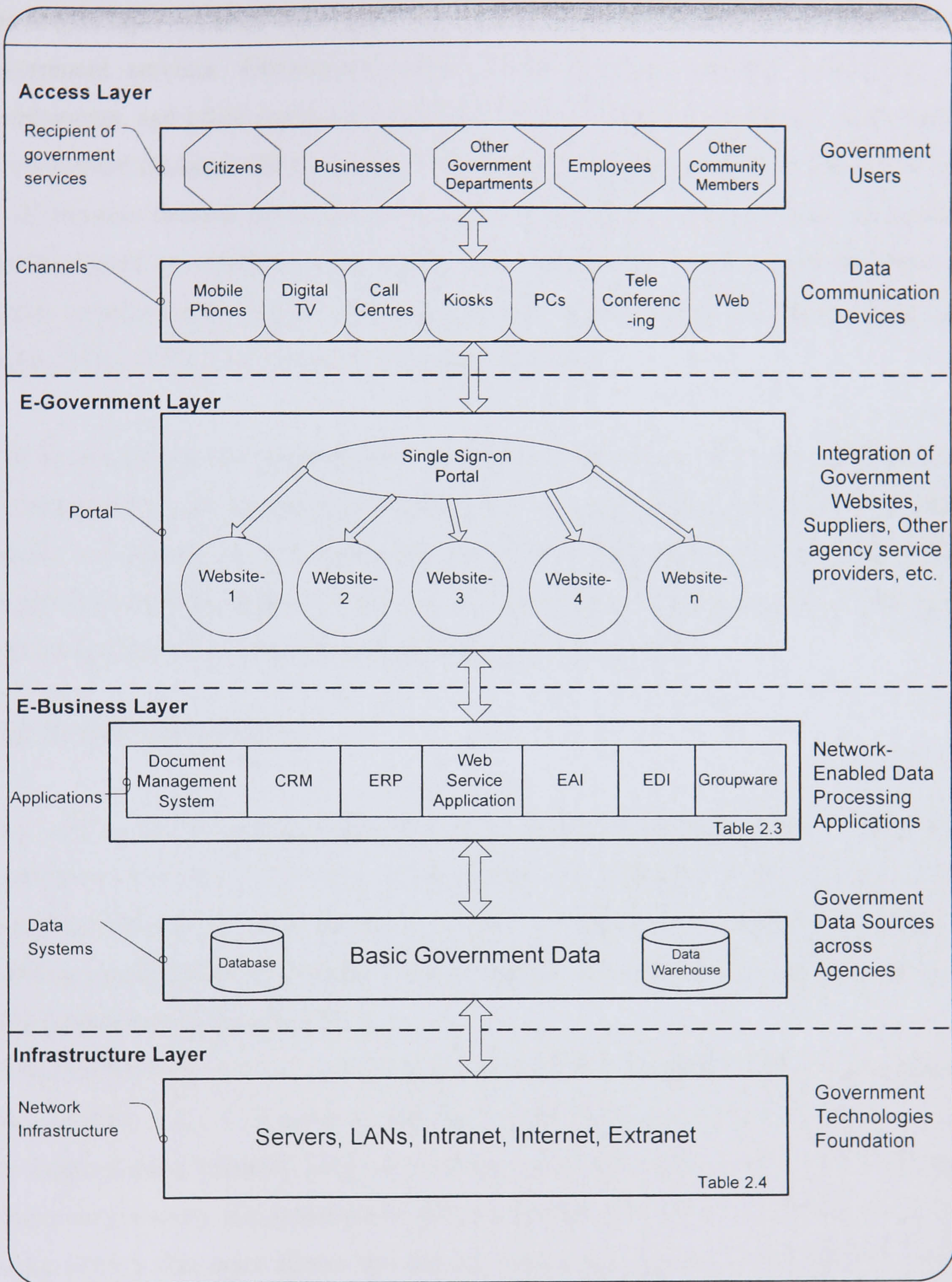


Figure 2.2: Framework of E-government Architecture

2.6.1 Access Layer

The access layer involves the channels by which government users can access the various government services. Government users can be citizens, business, employees, other governments, and other community members. Access channels are critical components of e-government (Cabinet Office, 2000). They consist of online and offline channels or routes of distribution through which products, services and information are used, accessed and communicated by multiple technologies. For example, web sites accessible from PCs, kiosks, mobile phone, digital TV, and call and contact centres (Cabinet Office, 2000; Heeks, 2001; Office of Information Technology, 2001).

This layer concerns the simplest level of e-government architecture, since it is controlled and managed by government users. However, it is essential that public sector organisations provide a common way of finding all government information and services, maintain channel coordination, create a common look and feel across different channels, and comply with the guidelines of technical standards (Cabinet Office, 2000).

2.6.2 E-government Layer

This layer is for integrating digital data from various organisations into a web portal of government services, in the form of a one-stop e-government portal. This may result in improving access to government resources, reducing service-processing costs, and enabling organisations to provide a higher quality of service (Gant and Gant, 2001; Ho, 2002; Sharma and Gupta, 2002).

Government web portals are emerging as a key priority for public sector organisations, as they develop their e-government initiative and create electronic interaction between government and citizens (G-to-C), government and business (G-to-B), government and its employees (G-to-E), and government and government (G-to-G). According to Chan and Chung (2002), this layer allows the user to employ the web browser to get all corporate information needed through a single window. The portal has a web-based front-end application that allows dispersed sources of information to be linked together. Governments can access and manage all data and information while providing users with the opportunity to customise what they need from information sources (Chan and Chung, 2002). For example, when a citizen moves from his/her residence, there is no need to update this information for all organisations that require a current address. The use of an

integrated portal will reduce overhead and improve information flow (Beynon-Davies, 2005). Without such a resource, citizens will need to identify relevant organisations to contact, and complete and submit change of address forms for each, which is clearly time-consuming and non-value adding. So the use of an integrated web portal is increasingly becoming an important component of e-government infrastructure, since it allows citizens to reduce this cumbersome process to a single step.

Since governments are very complex organisations with hundreds of agencies, departments, directorates, commissions, and regulatory bodies, a single government portal is still in its infancy stage. One of the reasons is that it is difficult to determine which features and applications are most appropriate for creating a high-functioning e-government portal. Another reason is technical; providing integrated services can only be realised if all public authorities are interconnected and their systems are interoperable (Gant and Gant, 2001; Wimmer and Tambouris, 2002). It needs comprehensive technology, systems integration and project management skills, as will be explained for the e-business layer. IBM (2001) reports three levels of complexity: information publishing and linking of existing web sites, single organisation transactions, and transactions requiring integration of multiple organisations. From a portal management perspective, it is necessary to maintain user interface construction abilities to increase user control, such as search capabilities, interactive media, and graphics design; and other key features such as e-mail, calendars, instant messaging, and chat areas (Chandler and Emanuels, 2002; Sharma and Gupta, 2002). As well as including tools to register, dynamically recognise and classify users, and giving the organisation the ability to customise content, information access, and structure to meet the specific needs of employees. Security is another key element of this layer; e-government services have to be secure in all aspects, so that the government and the citizens trust the system and feel confident in using it (Kaliontzoglou *et al.*, 2005). In order to support the secure electronic services, government should deploy the authentication and privacy standards to secure online transactions and protect the portal contents (Cabinet Office, 2000).

2.6.3 E-business Layer

This layer is focused on using ICT applications and tools to harness a network of trust, knowledge sharing and information processing that take place both within and between organisations (Moodley, 2003). Practically, it integrates front-end e-government layer applications, such as on-line catalogues and transaction interfaces in the government

portal, with back-end activities such as existing databases and data warehouses. This integration will render information entered by citizens/ business updated dynamically and effectively from back-end systems (Beynon-Davies, 2005).

The implementation of this layer will provide a strong foundation to build a single e-government portal, as stated for the e-government layer, and also high potential support the relationship and interaction between government and government (G-to-G) to government and its employees (G-to-E). It provides a seamless, automatic and real-time communication between their systems at both a data and process level (Borras, 2004; Kaliontzoglou *et al.*, 2005). In terms of G-to-E, it enables employees to interact efficiently with other departments and agencies concerning human resource information, retirement plan, latest news releases, and drawing on the available resources in an optimal way. This results in supporting decision-making in the formation of new value chains, and reinforces the existing business partner's relationship in the form of electronic procurement (Bandyopadhyay, 2002; Chan and Chung, 2002).

The integration of disparate IT applications and platforms inside and outside the organisational boundary remains a difficult task, costly and time consuming, due to the heterogeneity of the computing environments involved in public sector organisations (Chen, 2003; Kaliontzoglou *et al.*, 2005; Themistocleous and Irani, 2002). As well, the legacy systems and applications across government organisations need to be upgraded to a web-enabled level to extend their functionalities beyond organisational boundaries and to achieve full communication between all the information systems and their processes (Kaliontzoglou *et al.*, 2005).

Traditionally, government departments and organisations have maintained separate databases that are not connected to other government departments at the same level or even different level, such as local or central government level. This creates barriers between organisations' systems and processes, in terms of data transmission and communication (Layne and Lee 2001), and therefore makes implementation of an e-government single portal not easy (Borras, 2004). Therefore, the integration of government database systems, and interoperability of processes and applications plays a critical role in this layer, since e-government relies to a significant degree on existing basic government data, existing systems and existing processes (Heeks, 2001). This layer implies computer systems and applications of different public departments and organisations are being connected to or at least communicating with each other. As a result, the transaction from one system can be interchanged with another system. For instance, if a citizen performs a certain transaction

at a local department or agency, the information and results of the transaction will be propagated to the city or central counterpart (Layne and Lee, 2001). Consequently, this connection will result in easier, more flexible and reliable access to government data, as well as improving the business processes and operations of organisation and management of government IT resources (Borras, 2004). This should result in significant financial savings by eliminating redundant data collection, increase the speed of transactions, improve the consistency of outcomes, and increase opportunities for cost-sharing partnership.

The continual development in ICTs in the last two decades has presented private sector organisations with many choices of applications and technologies to support infrastructure integration of e-business applications and systems which can benefit the public sector to implement an effective e-government portal and support their business process. Table 2.3 describes some examples of these applications. Common approaches for the e-business layer involve integrating legacy systems, or computer systems that are not connected and do not share data. For example, Enterprise Resource Planning (ERP), Enterprise Application Integration (EAI), and web services. ERP systems are integrated and draw directly from live databases linked to the systems. However, ERP systems do not allow organisations to make *significant* changes in their systems – changes of parameters. The reason for this is that the customisation of ERP systems is difficult, costly, and risky (Themistocleous and Irani, 2002). However, EAI systems have emerged to overcome some of the limitations of ERP, through providing an integrated organisational infrastructure. It has the ability to control and distribute information throughout the organisation and to manage the control and distribution effectively (Erasala *et al.*, 2003). Web services technology is the latest approach to developing e-business integration that can be adopted in government organisations, since today it is the most promising candidates in achieving seamless interoperability, with less complexity, and with costs also being reduced (Borras, 2004; Kaliontzoglou *et al.*, 2005). Web services technology is based on XML and can be implemented with Java tools and standards like the Web Services Description Language (WSDL) (Kaliontzoglou *et al.*, 2005). Hence, it is standards-based and suited to build a common infrastructure to reduce the barriers of business integration, and then enable e-government systems to collaborate with each other regardless of underlying infrastructure (Borras, 2004; Huang and Chung, 2003; Ratnasingam and Pavlou, 2002). Consequently, XML-based data exchange lets different systems inside and outside government

organisations exchange information more freely with existing database systems and applications.

Additionally, this layer merges a wide spread of applications and systems that help maintain governments' existing data and business processes, as shown in Table 2.3. These applications can use the access layer to deliver information and services to citizens by using different channels. Among these are CRM, which focuses on managing citizens' interaction with the government. It represents a new concept of relationships between government and citizens, 'citizen- focused', through delivering services to citizens efficiently across different channels (see Access layer), and enabling joined-up and automated service delivery (Janssen and Wagenaar, 2002). It entails public sector organisations offering their 'customers' a host of online options, which allows them to manage individual personal profiles that contain user-specific information, such as the status of an accident report, and pay council, income, and road taxes (Burn and Robbins, 2001). However, the CRM system cannot work independently in this layer, and there is a need for integrated information systems and applications that support its operations and provide essential data. As Table 2.3 illustrates, such common applications and systems are DBMS, Document Management Systems, and Data Warehousing, which can hold citizens' records, official documents, historical information, and maintain business processes and procedures (Table 2.3 describes these applications).

Practically, this layer includes several applications and tools that are emerging to help determine, assess, and achieve consistent and integrated processes and information systems in public sector organisations. However, it is difficult to predict which applications and information systems will be the most useful and adaptable in this layer. In Table 2.3, the researcher describes a selection of applications that play a significant role in the e-business layer of e-government framework architecture.

Information System	Description	Characteristics	References
Database Management System (DBMS)	Organisation of components that define and regulate collection, storage, management, and use of data within database environment	<ul style="list-style-type: none"> • Stores and manages large amount of data • Maintains internal records • Presents data and records to citizens through WWW • Supports concurrent access to data • Controls access to data 	Garcia-Molina <i>et al.</i> (2002) Rob and Coronel (2002)
Customer Relationship Management (CRM)	Alignment of governmental business processes with citizen needs to manage and ensure they are served in a logical manner and decrease costs of providing services regardless of business lines	<ul style="list-style-type: none"> • Creates confidence between citizens and government • Creates citizen profiles • Enables higher levels service • Timesaving for citizens • Increases transparency and openness of government transactions 	Ho (2002) Janssen and Wagenaar (2002) Office of Information Technology (2001) Wimmer <i>et al.</i> (2001)
Enterprise Resource Planning (ERP)	Represents business management system that integrates information flow across all functions of organisation to automate corporate business processes	<ul style="list-style-type: none"> • Solves incompatible between government systems • Supports high-level decision making • Supports financial and human resource management • Establishes interactive relationships between public sector organisations and with other partners and suppliers 	Bandyo-Padhyay (2002) Chen (2003) Holland and Light (2001) Yen <i>et al.</i> (2002)
Web Services Application	Performs encapsulated business functions ranging from simple request-reply to full business process interaction. Government organisations can integrate a powerful, sophisticated search engine into their Internet, extranet, and intranet environments without the need for large capital investment or substantial systems integration.	<ul style="list-style-type: none"> • Develops business process integration solutions • Offers standardised service interfaces and common communication protocols • Implemented via XML/HTTP and WSDL • Provides comprehensive and dynamic integration capability with back-end systems • Reduces the cost of integration • Accommodates future changes more easily 	Borras (2004) Goble (2003) Huang and Chung (2003) Kaliontzoglou <i>et al.</i> (2005) Ratnasingham and Pavlov (2002)
Enterprise Application Integration (EAI)	Integrates both intra- and inter-organisational systems by securely incorporating functionality from disparate applications in government organisations.	<ul style="list-style-type: none"> • Supports data, objects, and processes incorporation • Transports and transforms information between applications • Provides quick response to change • Reduces development and integration cost 	Chesher <i>et al.</i> (2003) Themistocleous <i>et al.</i> (2002)
Data Warehousing	Essentially database that stores integrated, often historical, and aggregated information extracted from multiple, heterogeneous, autonomous, and distributed information sources.	<ul style="list-style-type: none"> • Gathers and integrates data from disparate sources • Helps to find and use information and records regardless of physical formats and locations • Used for strategic decision making 	Dawes <i>et al.</i> (1999) LechtenbOrger and Vossen (2003) Wimmer <i>et al.</i> 2001
Electronic Data Interchange (EDI)	Electronic transfer of structured data and services using agreed message standards between computer applications	<ul style="list-style-type: none"> • Designed to exchange documents between organisations • Supports application-to-application interface • Speeds up business processes and transactions • Provides efficient service 	Chesher <i>et al.</i> (2003) Iacovou <i>et al.</i> (1995)
(Content) Document Management Systems	Capability to store, upload, share, and manages multi-media format records that associated with automated workflow and electronic document repositories.	<ul style="list-style-type: none"> • Shares various kind of documents within and between organisations • Increases efficiency of supply chain • Increases efficiency of maintaining, accessing and distributing documents via Internet 	Dawes <i>et al.</i> (1999) Loukis and Kokolakis (2003) Yao <i>et al.</i> (2003)
Data and Knowledge Management System	Systemic approach to capturing information and knowledge about organisation, its processes, products, services, procedures used to conduct planning and programme evaluation in areas ranging from capital construction, to economic forecasting, to performance of school.	<ul style="list-style-type: none"> • Controls processes beyond internal structures of government • Provides formalised and mapped results and data to the government portal • Makes knowledge available to citizens 	Dawes <i>et al.</i> (1999) Joia (2004) Wimmer and Traunmuller (2000)

2.6.4 Infrastructure Layer

Building an information community by using e-business layer applications in an efficient manner requires a technology infrastructure that reaches out to all parts of public sector organisations. However, electronic communication within and between public sector organisations is expensive and inefficient without an effective infrastructure and agreed standards and protocols between communicating systems (Kaliontzoglou *et al.*, 2005). Therefore, this layer focuses on technologies that should be in place before e-government services can be offered reliably and effectively to the public (McClure, 2000). The potential of these technologies is to support and integrate the operations of information systems and applications in the e-business layer across organisations (see Figure 2.3) by offering the necessary standards and protocols through network and communication infrastructure approaches (e.g. intranet, extranet, and Internet) (Singh, 2002). Table 2.4 explains these technologies, for example the incorporation of distributed network infrastructure approaches supporting the organisation knowledge infrastructure, such as a customer database on a client server system providing information required for CRM application. This layer provides basic technologies, such as LAN, as discussed in Table 2.4, that allow integration with current hardware resources such as PCs, laptops, and mobile phones straightforwardly and without complications, which support the organisation's existing IT provision. As well, they should support the provision of user-friendly and innovative on-line services involving the transmission of data of various formats such as text, graphics, audio and video (Bandyo-Padhyay, 2002).

IBM (2001) concluded that to have a successful e-government strategy, the public sector must create an IT infrastructure that is optimised to support new information systems and applications that are necessary for e-government - as demonstrated in Figure 2.3. They suggest that an e-government IT infrastructure may comprise a number of technologies with a network infrastructure at its genesis, including an application server, hardware and operating systems, and data and application development tools. Table 2.4 illustrates a selection of technologies that can play an important part in the infrastructure layer. These technologies support the acquisition, storage, and transformation of data, regardless of whether the data source is residing in an internal business unit or an external organisation boundary (Bandyo-Padhyay, 2002), therefore resulting in new ways of dealing with business partners and citizens. Additionally, they necessitate the implementation of the

applications and procedures that enable not only G-to-C and G-to-G communication worldwide, but also strengthen the communication of information within an organisation.

Technology	Description	Characteristics	References
LAN	Computer network concentrated in geographical area, such as building or government department.	<ul style="list-style-type: none"> • Interconnects variety of devices • Shares citizens files and records • Provides information exchange among devices 	Kurose and Ross (2003) Stallings (2000)
Server	Highly professional and powerful computer that runs and hosts application program that accepts connections in order to service requests by sending back responses	<ul style="list-style-type: none"> • Provides high speed access to government data and services • Processes communication across government network 	Kurose and Ross (2003) Stallings (2000)
Internet	Collections of public and global communications network that provides direct connectivity to anyone over LAN or Internet Service provider	<ul style="list-style-type: none"> • Allows citizen to access government information and services from any location and at any time • Exchanges data and messages • Provides low cost communications 	Singh (2002) Stallings (2000) Walczuch <i>et al.</i> (2000)
Intranet	Network designed to be open and secure, with web browsing software providing easy point-and-click access by end users to multimedia information on internal web sites within limited geographical area.	<ul style="list-style-type: none"> • Enhances connectivity and communication within government organisation • Enhances resources sharing and planning process. • Provides information to users in real-time manner 	Bandyo-Padhyay (2002) Chan and Chung (2002) Chesher <i>et al.</i> (2003)
Extranet	Extension of intranet, dynamic wide area networks that link company's employees, suppliers, customers, and other key business partners in electronic online environment for business communication.	<ul style="list-style-type: none"> • Handles purchase order, receiving, invoicing to be done electronically over secured network. • Supports G-to-G and G-to-B • Supports supply chain management with business 	Bandyo-Padhyay (2002) Chan and Chung (2002) Singh (2002)

Table 2.4: Infrastructure Layer Technologies

IBM (2001) and Singh (2002) indicate that the key component of IT infrastructure in government organisations is the application server. Consisting of server hardware, server operating system, and different applications, server software runs the e-government application logic and manages the user interaction. These servers are operated through efficient network technology and Internet connectivity, which improves communication and information transmission within and between organisations, resulting in new ways of dealing with business partners and users, such as online transactions and procurement services. However, security of infrastructure is still one of the most crucial and least understood issues associated with Internet-based communication and applications (Medjahed *et al.*, 2003). Security is an ongoing risk associated with most IT projects, and in terms of e-government, the degree of risk is escalating as the use of public networks

increases, together with databases that hold citizens' profiles and government information (Kaliontzoglou *et al.*, 2005). Therefore, this layer needs to incorporate advanced security approaches and technologies such as PKI, reliable firewall, intrusion detection system, biometrics, digital signature and certificate, and sophisticated encryption technique, which secure e-government interoperation, government electronic transactions, and delivery systems to ensure protection against fraud and other vulnerabilities at all levels of the government information infrastructure.

The significance of e-government architecture framework is about the integration between government existing technologies and essential applications and information systems required for e-government operations. As well, the consistency of layers should be given the required attention during the implementation of e-government, as Figure 2.3 demonstrates, so that each layer is connected to the adjacent layer, in which poor implementation of one layer can affect the performance of the rest of layers, and therefore, will degrade the performance of e-government.

2.7 Benefits of E-government Adoption

The adoption of e-government offers substantial benefits for government organisations. However, it is difficult to determine the precise benefits associated with e-government adoption (Beynon-Davies, 2005). This section analyses the benefits of e-government that are suggested from the literature and a number of results from published case studies.

As with many IT projects, one of the anticipated benefits frequently discussed in the literature is improving efficiency by reducing errors and improving the consistency of outcomes by automating standardised validation (Beynon-Davies, 2005; Carbo and Williams, 2004; Ma *et al.*, 2005). In additions to these benefits, e-government projects are seeking efficiency and effectiveness that can be achieved by reducing cost and layers of organisational processes through reengineering and streamlining operating procedures (Burn and Robins, 2003; Duffy, 2000). Beynon-Davies (2005), in his study of Inland Revenue organisation in the UK, found that the consequence of less administration could lead to saving in staffing. The case organisation estimates that a saving of £3 administration per return is feasible. The results of study also estimate that when take-up of e-services reaches 50%, then saving of some 1300 posts is likely, freeing staff to be employed in other areas. However, cost saving is not the main objective behind the

adopting of e-government in the public sector (James, 2000; Timonen *et al.*, 2002). Nevertheless, e-government initiatives propose to enhance efficiency of government organisations, improve the quality of public sector organisation services through quicker transactions, improve accountability, provide better business processes, and create new services (Heeks, 2001; James, 2000; Seifert and Petersen, 2002; Timonen *et al.*, 2002).

2.7.1 Classification of E-government Benefits

E-government is definitely more than just changing the organisational operating process and redesigning citizens' services using state-of-the-art IT. Although the full potential of the e-government initiative is not yet fully known, Table 2.5 classifies these benefits based on a fundamental categorisation an extended from Shang and Seddon (2000). Table 2.5 summarises benefits of e-government adoption for public sector organisations, which have been recognised through experiences and normative literature analysis.

Category	E-government Benefits	References
Internal	<ul style="list-style-type: none"> ■ Improve internal data management and support decision making process ■ Increase productivity and transparency of government organisations ■ More organised and effective workflows and business process ■ Reduce layers and complexity within organisational processes ■ Improve quality and efficiency of data and services 	<ul style="list-style-type: none"> ■ Beynon-Davies (2005) ■ Bonham <i>et al.</i> (2001) ■ Carbo and Williams (2004) ■ Chandler and Emanuels (2002) ■ Heeks (2001) ■ Ma <i>et al.</i> (2005) ■ Seifert and Petersen (2002)
Operational	<ul style="list-style-type: none"> ■ Increase understanding of government procedures, rules and policies through enhancing availability and access to government information. ■ Improve accountability and transparency of government transactions ■ Reduce amount of time spent on government services delivery ■ Reduce communications and operational costs between organisations ■ Reduce cost of services delivery and transactions provided to citizens and business ■ Develop new skills and motivations for government employees by reducing amount of time spent on repetitive tasks 	<ul style="list-style-type: none"> ■ Beynon-Davies (2005) ■ Bonham <i>et al.</i> (2001) ■ Chandler and Emanuels (2002) ■ James (2000) ■ Moon (2002) ■ National Research Council (2002) ■ Seifert and Petersen (2002) ■ Tambouris <i>et al.</i> (2001) ■ Wiskott (2002)
Technical	<ul style="list-style-type: none"> ■ Improve connection within and between organisations ■ Enhance government ICT infrastructure ■ Provide portability between systems and applications ■ Increase reliability, consistency and accuracy of data sharing ■ Reduce redundancy of data, applications and infrastructure 	<ul style="list-style-type: none"> ■ Atkinson and Ulevich (2000) ■ Borrás (2004) ■ Chandler and Emanuels (2002) ■ Kaliontzoglou <i>et al.</i> (2005)
External	<ul style="list-style-type: none"> ■ Digitising procurement services from and to the business sector by better management and control of government procurement systems ■ Increase collaboration and partnership with the private sector and community organisations ■ Process and respond quickly to citizens' needs and expectations ■ Increase coordination and collaboration among public sector organisations through strengthening connections between them ■ Attract more foreign direct investments and business projects 	<ul style="list-style-type: none"> ■ Beynon-Davies (2005) ■ Bonham <i>et al.</i> (2001) ■ Cabinet Office (2000) ■ Carbo and Williams (2004) ■ Duffy (2000) ■ Heeks (2001) ■ Ma <i>et al.</i> (2005) ■ McClure (2000) ■ Moon (2002) ■ National Research Council (2002) ■ Timonen <i>et al.</i> (2002) ■ Tyndale (2002) ■ Wimmer and Tambouris (2002) ■ Wiskott (2002)

Table 2.5: Classification of E-government Adoption Benefits

2.8 Barriers to E-government Adoption

Many e-government initiatives are in their strategic phase of implementation (infancy). However, some key problems and barriers are already beginning to emerge. There are a number of barriers experienced in public sector organisations that prevent the realisation of anticipated benefits and degrade successful adoption of e-government projects (Beynon-Davies, 2005; Hu et al., 2003; Pavlichev, 2004). This section analyses and summarises the barriers of e-government adoption experienced by public sector organisations.

Technology itself would not guarantee success with e-government but, it is necessary that any e-government initiative must ensure that it has sufficient resources, adequate infrastructure, management support, capable IT staff, and effective IT training and support (Sanchez *et al.*, 2003). Despite the cost of IT components going down, an adequate IT infrastructure still represents the key barrier to e-government adoption. The infrastructure is composed of hardware and software that will provide secure electronic services to citizens, businesses, and employees. Bonham *et al.* (2001), Bourn (2002), Dillon *et al.* (2002), Hu *et al.* (2003), Joia (2004), and McClure (2000), in their research, agree that governments view a lack of technical infrastructure as a significant barrier to the development of government organisations' capabilities to provide online services and transactions. They also agree that unreliable IT infrastructure in public sector organisations will degrade e-government performance.

Practically, Dillon *et al.* (2002) and Layne and Lee (2001) emphasise the importance of network capacity and communication infrastructure (i.e. Infrastructure layer, see Section 2.6.4) as an important foundation for integrating information systems across government organisations. It should be in place before e-government services can be offered reliably and effectively to the public (McClure, 2000). Therefore, the key to success in an e-government strategy is to implement an adequate IT infrastructure that will support a user's experience of easy and reliable electronic access to government (Eddowes, 2004). For example, as discussed in earlier Section 2.6.4, intranet and extranet should be maintained in public sector organisations to provide a reliable groundwork for required information systems and applications. As Table 2.6 illustrates, many examples of barriers exist that are associated with IT infrastructure, and as discussed earlier in Section 2.6.4, LAN, reliable server, and Internet connections are important to build a strong foundation for e-government infrastructure.

A barrier frequently cited is the need to ensure adequate security and privacy in an e-government strategy (e.g. Chen and Gant, 2001; Daniels, 2002; Eddowes, 2004; James, 2000; Joshi *et al.*, 2001; Lambrinouidakis *et al.*, 2003; Layne and Lee, 2001; Sanchez *et al.*, 2003). Bonham *et al.* (2001) and Gefen *et al.* (2002) agree that one of the most significant barriers for implementing e-government applications is computer security, privacy and confidentiality of the personal data. For example, one of the sophisticated applications of e-government is e-voting, which uses electronic ballots that allow voters to transmit their vote to election officials over the Internet. This application requires extensive security to secure the voting process and protect the voter personal data.

In addition, government organisations at all levels use, collect, process, and disseminate a wide range of sensitive information on personal, financial, and medical matters. Hence, IT departments in organisations should be aware that security and privacy are not only critical for the availability and delivery of government services but also to build citizen confidence and trust in the online services and transactions they provide or will be providing (Beynon-Davies, 2005; Sanchez *et al.*, 2003). In a study of 2,015 government consumers conducted by Jupiter Research in New York in 2003, more than three-fourths were concerned about the security of their credit card information, and nearly two-thirds were worried about the privacy of personal information. McClure (2000) criticises the weakness of information systems' security in public sector organisations. He claims that e-government is only considered to succeed when all its participants including government agencies, private businesses and citizens feel comfortable using electronic means to carry out private and sensitive transactions. As a result, investing in the best available privacy and security applications and tools is worthwhile, as a shortage of them could lead to failure of the entire e-government project (Eddowes, 2004). Gefen *et al.* (2002), in the study of online tax services, agree, and demonstrate the importance of trust in the public sector alleviating data privacy concerns and facilitating e-government diffusion. In addition, information management policy guidelines and standards must be reviewed periodically to ensure that they are adequate for the electronic services delivery world. The guidelines require that government web sites use privacy notices to ensure that citizens will know what personal information may be collected and how its will be used.

Chen and Gant (2001), Heeks (1999), Ho (2002), Joia (2004), and Moon (2002) identify the shortage of IT skills as another potential barrier that confronts some demanding challenges concerning government's ability to provide the next generation of e-government services. It is ranked as the number one barrier to e-government, based on the e-

government survey conducted in the USA in 2000 by the International City/County Management Association and Public Technology, Inc (Norris *et al.*, 2001). One of the reasons for this is the difficulty of attracting and retaining the right IT talent, especially considering the competition for these workers, and also there is a lack of skilled staff in the market who are familiar with major IT skills, as McClure (2000, p.18) notes: “*The increasing need for qualified IT professionals puts governments in direct competition with the private sector for scarce resources*”. These skills include computer information systems analysis, systems design, network construction, applications integration, maintain middleware technologies such as database-oriented, transaction-oriented, and message-oriented, operational management, web development, project management, and systems maintenance, which are absent, or cannot be recruited easily by the public sector. These positions have high complexity and scarcity of qualified applicants. However, some governments may have IT staff, but most of their training may not equip them to program industry-strength web-enabled applications. The challenge of new technology has led to an increased commitment to training by public sector organisations (Pavlichev, 2004).

Moon (2002), in his research, concluded that to enhance the effectiveness of e-government practices, public sector organisations would need to move towards a higher level of e-government development, which will require more and highly trained technical staff. Moreover, without fully developing staff capabilities, agencies stand to miss out on the potential customer service benefits presented by technology, so employees must have the training and tools they need to do their jobs.

A further common problem associated with government is that the turnover rates of IT staff from public sector organisations are generally increased because it is felt that payment and conditions can not compete with those of private sector organisations, which severely affects the progress of the implementation process of e-government.

Other authors have found that a further key barrier to e-government adoption tends to be organisational. Li and Steveson (2002), for instance, have confirmed that to maximise the potential offered by an e-government initiative, government organisational culture, management strategy and individual attitudes within the organisation need to be changed. Organisational barriers relate to structural issues, such as fragmentation and poor relations and communication between functional departments, and an acceptance by senior management of the strategic benefits of new initiatives (Aichholzer and Schmutzer, 2000; Fletcher and Wright, 1995; Hu *et al.*, 2003). As well, it relates to the complexity of government business process, management strategy, and organisational culture (Joia, 2004;

Lenk and Traunmuller, 2000; McClure, 2000). For example, some branches of government may have the power to control or block certain information so that it cannot be transmitted (Hu *et al.*, 2003; Joia, 2004).

While effective top management leadership involvement is a cornerstone of any IT investment strategy, strong government leadership and responsive management processes must support an e-government initiative. The reason for this is the complexity and scale of the changes that will take place in the organisation during the implementation of e-government (Bonham *et al.*, 2001; Burn and Robins, 2003). However, some government officials perceive e-government as a potential threat to their power and viability because it might reduce their authority in government, therefore becoming reluctant to the idea of online transactions (Ebrahim *et al.*, 2003; Sanchez *et al.*, 2003). As with e-business, public sector administrations are required to change and reengineer their business process to adapt with new strategies and culture of e-government. Government staff should be prepared for new ways of dealing with new technologies that emerge with e-government (Joia, 2004). For example, they are used to dealing with physical papers and forms, paper receipts, and traditional physical signatures, while e-government allows citizens access to the organisation back-office remotely to complete the transaction processing, which emerged with new technology solutions such as electronic forms, digital signatures, electronic receipts and certificates (Ebrahim *et al.*, 2003). From another perspective, organisational culture also forms barriers to e-government within the organisation, since some departments are reluctant to share their business data or processes with other departments within the same organisation or with external partners. They believe that connection or data sharing will weak their authority (Pavlichev, 2004). For these departments and organisations, the ownership and the control of business data and processes are related to their power, which implies that politics also form a barrier to e-government adoption.

Another barrier to the adoption of e-government is central government funding (Bonham *et al.*, 2001; Heeks, 1999; Ho, 2002). Traditionally, the main financial resource for public sector organisations is coming from central government, which is hard to control, and sometimes comes and goes in cycles of 'feast and famine' that make it difficult to plan sustainable IT initiative such as e-government (Heeks, 1999). Hence, the lack of financial resources from central government for e-government investments was seen as a major barrier, particularly by stakeholders from the government sector (Eddowes, 2004). According to the e-government survey in the USA in 2000; reported by Norris *et al.*

(2001), over 50% of respondent government organisations indicated that lack of financial resources is a main barrier to adopting an e-government initiative for a public sector organisation.

Adoption of e-government requires a compatible IT infrastructure and integrated information systems, as well as advanced technologies for preserving security and integrity. Hence, for a public sector organisation, the cost of sophisticated hardware and software is still a big problem. Another important financial problem is the high operational cost of the existing IT infrastructure. The maintenance cost of such an infrastructure is high, which presents additional financial barriers. Therefore, organisations evaluate the cost relative to the benefits before adopting a new technology. Technologies that are perceived to be low in cost are more likely to be adopted (Irani *et al.*, 2003; Palvia *et al.*, 1994). Alternatively, some public sector organisations turn to outsourcing their information systems' activities to run e-government implementation in order to cut costs and thereby achieve more within financial constraints.

The researcher analysed e-government barriers and classified them into categories, with examples, as shown in Table 2.6. This classification is based on an analysis of a range of literature and case-based studies of some countries, which can help researchers and practitioners to have prior knowledge and better understanding of e-government barriers.

2.8.1 Classification of E-government Barriers

A number of different models such as those proposed by Shang and Seddon (2000), Themistocleous and Irani (2001), and Ward and Griffiths (1997) exist in the literature to classify the barriers to information systems' infrastructure development.

Shang and Seddon (2000) and Themistocleous and Irani (2001) propose a model to classify the barriers derived from IT infrastructure, such as ERP. These models are considered adaptable for the classification of e-government barriers, since the main purpose of e-government adoption is to automate business processes and integrate IT infrastructures in public sector organisations. Table 2.6 analyses e-government barriers and then classifies them accordingly in order to provide a comprehensive insight to those barriers restricting the adoption of e-government in government organisations.

Category	E-government Barriers	Reference
IT Infrastructure	<ul style="list-style-type: none"> ■ Shortage of reliable networks and communication ■ Inadequate network capacity or bandwidth ■ Lack resources standards and common architecture policies and definitions ■ Existing systems incompatible and complex ■ Existing internal systems have restrictions regarding integrating capabilities ■ Lack of integration across government systems ■ Integration technologies of heterogeneous databases are confusing ■ High complexity in understanding the processes and systems in order to redesign and integrate them ■ Availability and compatibility of software, systems and applications ■ Lack of documentation, especially in case of custom systems 	<ul style="list-style-type: none"> ■ Beynon-Davies(2005) ■ Dillon et al. (2002) ■ Eddowes (2004) ■ Fletcher and Wright (1995) ■ Heeks (2001) ■ Joia (2004) ■ Layne and Lee (2001) ■ McClure (2000) ■ Moon (2002) ■ Themistocleous and Irani (2001)
Security and Privacy	<ul style="list-style-type: none"> ■ Threats from viruses, worms and Trojans ■ Absence of privacy of personal data ■ Unauthorised external and internal access to systems and information ■ Assurance that transaction is legally valid ■ Lack of security rules, policies and privacy laws ■ Inadequate security of government hardware and software infrastructure ■ Lack of risk management security programme ■ Unsecured physical access to building or computers rooms 	<ul style="list-style-type: none"> ■ Beynon-Davies(2005) ■ Gefen <i>et al.</i> (2002) ■ Joia (2004) ■ Joshi <i>et al.</i> (2001) ■ Lambrinoudakis <i>et al.</i> (2003) ■ Robins (2001) ■ Sanchez <i>et al.</i> (2003) ■ Zeichner, (2001)
IT skills	<ul style="list-style-type: none"> ■ Lack of IT training programmes in government ■ Shortage of well-trained IT staff in market ■ Lack of employees with integration skills ■ Developing of web site by unskilled staff ■ Shortage of salaries and benefits in public sector ■ Flow of IT specialist staff 	<ul style="list-style-type: none"> ■ Bonham <i>et al.</i> (2001) ■ Heeks (1999) ■ Ho (2002) ■ Layne and Lee (2001) ■ Pavlichev (2004)
Organisational	<ul style="list-style-type: none"> ■ Lack of coordination and cooperation between departments ■ Lack of effective leadership support and commitment amongst senior public officials ■ Complex of business processes ■ Political and cultural issues ■ Resistance to change by high level management ■ Time consuming for reengineering business process in public organisations 	<ul style="list-style-type: none"> ■ Burn and Robins (2003) ■ Hu <i>et al.</i> (2003) ■ Joia (2004) ■ Lenk and Traunmuller (2000) ■ Li and Steveson (2002) ■ Pavlichev (2004)
Financial Resources	<ul style="list-style-type: none"> ■ Main supply comes from central government ■ Shortage of financial resources in public sector organisations ■ High cost of IT professionals and consultancies ■ Cost of installation, operation and maintenance of ICT systems ■ Cost of training and system development 	<ul style="list-style-type: none"> ■ Bonham <i>et al.</i> (2001) ■ Eddowes (2004) ■ Heeks (1999) ■ Irani <i>et al.</i> (2003) ■ Palvia <i>et al.</i> (1994)

Table 2.6: Classification of E-government Barriers

2.9 Conclusions

This chapter reviews the normative literature to identify research issues in e-government. Relatively little has been shown in the literature about the adoption of e-government in public sector organisations. The researcher identifies a gap in the literature, dealing with the absence of theoretical models for e-government adoption in public sector organisations. Therefore this chapter establishes a background for the context of e-government that reduces the confusion surrounding the adoption of e-government in the public sector and hence supports the researcher in developing a conceptual framework for this research.

The researcher discusses the motivations that lead the public sector to e-government adoption, and in order to create better understanding of the reasons behind e-government adoption, the researcher categorises the motivations into different aspects: (1) Financial, (2) Technical, (3) Partnership, (4) Organisational, (5) Coordination, and (6) Strategic. According to these motivations, the researcher found that successful e-government adoption in public sector organisations would develop quality of services, improve accountability, and modernise organisation processes and structure.

The researcher then identifies the different sectors that will benefit from the adoption of e-government, and will therefore be connected electronically. These individual sectors are classified into four types of electronic interaction between e-government and other sectors while implementing e-government, namely (1) government-to-citizen, (2) government-to-business, (3) government-to-government, and (4) government-to-employees. The researcher identifies that each of sector has its own objectives, expectations and requirements.

While an increasing number of governmental units are incorporating or expanding the use of ICT into many of their activities, little is known about whether citizens are getting the information and services needed or about the state-of-the-practice of e-government. There is a confusion surrounding the adoption requirements and business models of e-government in government organisations, and hence many government organisations are still situated in the early stages of e-government adoption. Therefore, there is need for a strategic framework that portrays the roadmap of the e-government implementation process that can help reduce this confusion and can be used as a tool to support the decision-making process in government. The literature review process has identified that there is a void in some aspects of e-government adoption in the public sector. As a result, the researcher develops a novel framework for e-government architecture in this chapter

which is considered a significance stage in an e-government adoption strategy plan. This framework will help understanding of many unclear aspects of e-government adoption, and then will support the researcher to develop the proposed conceptual framework for e-government adoption in Chapter 3, and also can be used as a tool to validate the conceptual framework in fieldwork reported in Chapter 5. E-government architecture framework defines standards, and identifies the infrastructure components, applications and technologies which are the guidelines for any successful IT project. Since it could be viewed from different angles, the researcher investigates e-government and other relevant area literature such as e-commerce and e-business to reach an integrated architecture. This framework will facilitate the exchange of data and services between departments and organisations, as well as support the consistency of government data and transactions from and to users. The researcher concludes that the architecture of e-government is divided into 4 layers: (1) access, (2) e-government, (3) e-business, and (4) infrastructure. The most critical part of the architecture is the e-business layer, due to the complex applications and systems contained in it which are responsible for integration, coordination and interaction within and between individual systems in public sector organisations.

Government organisations must carefully assess all technical, organisational, and political issues, and formulate a strategic framework for necessary organisational and management changes to eliminate potential barriers to successful e-government adoption. The barriers factor plays a substantial role in the process of e-government implementation in government organisations. Despite the potential benefits from the adoption of e-government in public sector organisation, there are a number of barriers experienced in public sector organisations which prevent the realisation of these anticipated benefits and place restrictions on successful adoption of e-government project. The researcher analyses the e-government barriers from the literature in the last two sections, and proposes classifications of them. The classifications map the barriers that arise before starting the implementation of e-government or during it. This categorisation helps the readers to have prior knowledge and understanding of e-government barriers. In addition, these barriers derived from diverse literature analysis and case studies of some countries, e-government barriers are categorised into: (1) IT infrastructure, (2) security and privacy, (3) IT skills, (4) organisational issues, and (5) operational cost.

Chapter 3

Conceptual Framework for E-government Adoption

Since e-government is a relatively new research area, there is a limited literature analysing its adoption and implementation process. As discussed in Chapter 2, the researcher identifies that e-government adoption in public sector organisations is an important research issue that has been inadequately studied in the literature; as a result, there is a void of a theoretical model for e-government adoption. Therefore, this chapter critically reviews the stages of growth model that has been empirically applied to related areas, such as e-commerce, web services, and IT adoption, that can be mapped onto e-government adoption. In addition, the chapter goes over IS literature that identifies the most significant factors that support the adoption of IT innovations in organisations. Consequently, the researcher will be able to adopt factors from other relevant areas in conjunction with the proposed stage of growth model in order to conceptualise a strategic framework for e-government adoption. The proposed framework can be used by government organisations when considering the adoption of e-government, and allows IT managers and researchers to better analyse and explore the implementation aspect of e-government. The proposed framework requires an empirical validation by the researcher, which will be reported in Chapters 5 and 6 of this dissertation.

3.1 Introduction

The aim of this chapter is to develop a conceptual framework for e-government adoption in public sector organisations. The proposed conceptual framework can support the implementation process of e-government in the public sector. The framework consists of three parts: stage of growth model, Technology-Organisation-Environment model proposed by Tornatzky and Fleischer (1990), and benefits-barriers model.

At the beginning of this chapter the researcher presents an introduction on the diffusion and adoption of innovation theory. The importance of this section is to demonstrate the impact of this theory on e-government adoption, and it also differentiates between adoption and diffusion concepts. Next, in Section 3.3, the researcher describes the current situation of e-government adoption in public sector organisation, and discusses the reasons why such adoption is still in its infancy stage.

In Section 3.4, the researcher introduces the proposed conceptual framework for e-government adoption. This section includes three sub-sections, each dedicated to explaining components of the proposed conceptual framework. Subsection 3.4.1 explains the central part of the conceptual framework, the stage of growth model. The researcher then justifies the significance of using this model in the conceptual framework of e-government adoption in public sector organisations. In doing so, the researcher identifies and analyses several suggested stage of growth models in the literature to propose the appropriate model that can fit in the context of public sector organisations in the Kingdom of Bahrain. As a result, the researcher proposes a four-stage model that characterises the adoption of an e-government initiative. These four stages are (1) government information delivery, (2) one-way service delivery, (3) two-way service delivery, and (4) government integration. Subsection 3.4.2 presents the analysis of the common adoption models of ICT, such as web services, Electronic Data Interchange (EDI), and e-commerce. The reason for this is to refine and identify factors that match the context of application, which is in this research public sector organisation, and also to address the characteristics of the proposed stage of growth model. The researcher then concludes that the Tornatzky and Fleischer (1990) framework is appropriate, as it can explain the factors influencing e-government adoption in the public sector. Subsection 3.4.3 explains the third part of the proposed conceptual framework for e-government adoption. In this section, the researcher reports that both perceived benefits and barriers in government organisations influence the decision making for e-government adoption, therefore the researcher proposes that benefits and barriers that are associated with e-government can be considered as essential factors

that influence the implementation of e-government. Due to the complexity of proposed conceptual framework, in Section 3.5 the researcher determines the components of the framework that will be tested and validated in the fieldwork

The researcher believes that such integration of different models in the proposed framework of e-government adoption will reduce the confusion surrounding the e-government adoption process in the public sector through understanding the implementation process, identifying the requirements of ICT tools, and highlighting the importance of the organisational readiness and the impact of environment.

3.2 Adoption and Diffusion of Innovation Theory

ICT innovations adoption and diffusion are increasingly being used to drive organisational change programmes intended to deliver significant performance improvements. Since innovation presents the potential adopters with new problem-solving tools or new opportunities (Thong, 1999), e-government initiative has the characteristics of innovation, and hence the innovation adoption literature can be applied in some parts to e-government adoption. The reason is that e-government often requires changes in government organisations' business process and practices. It also enables organisations to provide new service opportunities and new ways of interaction with constituents.

Therefore, adoption and diffusion of innovation theory serve as an important part for this study, and the researcher discusses the implications of this theory in this chapter to understand the concept of adoption and diffusion of e-government. Diffusion of innovation theory is concerned with how the use of an innovation spreads throughout a social system (Mahajan and Mueller, 1990). Diffusion theory has been applied to a wide range of technologies, including information and communication technologies, and adoption refers to the decision of any individual or organisation to make use of an innovation (Frambach and Schillewaert, 2002).

The innovation development process can be considered from a supply and demand perspective. The supply perspective focuses on the creation, production and diffusion of innovation, and the demand perspective encompasses the adoption, absorption, and application of an innovation. In the transition area between supply and demand, diffusion and adoption are centremost (Tornatzky and Fleischer, 1990). Diffusion generally works at a higher aggregation level than adoption, being mostly at the macro-economic level. The adoption process, however, takes place at the level of the individual adopting unit and at

the micro-economic level; the potential adopter of the innovation is an organisation, a division, or an individual (Knol and Stroeken, 2001).

Rogers (1995) defines diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system, and adoption as the process through which an individual (or other decision-making unit) passes from knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. In addition, Rogers (1995) defines innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”.

Despite Rogers (1995) having defined diffusion and adoption, this definition does not differentiate the role and the relationship between them, which results in their interaction being unclear for the researcher. Kishore and McLean (1998) discuss this issue; they argue that diffusion is one of the indications for success of the adoption process. Diffusion of innovation is declared when the innovation is widely adopted and used by most or all of the adopting units within the community of potential adopters.

In the context of this research, the adoption of e-government innovation is considered at the level of public sector organisations, and diffusion of e-government is the degree to which government electronic services are communicated and reach to citizens, business, and government employees. Therefore, the proposed conceptual framework in this thesis will be regarding the adoption process of e-government in government organizations that addresses the implementation process, organisation behaviour towards the adoption, and the influence of environment.

3.3 Need for E-government Adoption Framework in Public Sector

The importance of ICT for improving organisational performance has been recognised and extensively discussed by numerous researchers (e.g. Cooper and Zmud, 1990; Gallivan 2001; Rizzoni, 1991; Rogers, 1995). While primary awareness has recently gone to ICT in public sector organisations, government leaders and IT managers are increasingly aware of the potential of e-government to improve the performance and business processes of their organisations. E-government as an ICT strategy has emerged as an instrument that can bring potential benefits for public sector organisations, business, and citizens, such as cost saving, improvement in communication and coordination between organisations, expansion of citizens' participation, and increased government accountability. Hence, the adoption of e-government becomes an important strategic action plan for the public sector,

as it is a fundamental framework in modernising the government business process since many IT managers believe that e-government adoption will increase efficiency and save money through increased centralisation of resources, economies of scale, unification of government IS applications, and funnelling of all IT initiatives through qualified IT professionals (Melitski, 2003).

However, adoption of e-government is not straightforward and cannot be done in a limited period, rather it requires a systematic approach to place government information and services online. Further, many government organisations' officials have an incorrect stereotype that e-government is just setting up a server and posting web pages on it. The reason for this is that there is confusion among the government officials about the concept and strategic objectives of e-government adoption, and also there is unawareness in government organisations of the implementation process and critical factors that might influence the adoption. The implementation process of e-government has impacts on the entire aspects of government organizations, not only the technology, but also the need to reengineer the way that organisations run their business in terms of processes, management, workflows, policies, procedures, structures, and so on. While most managers tend to support it, many of them turn away when they realise how much that initiative is likely to change their traditional organisational structure (Cabinet Office, 2000; Heeks, 2001). This is one of the reasons why many government organisations are still in the infancy stage of e-government adoption. One important reason for this delay in adoption is that e-government requires significant changes in organisational roles and processes, which, in turn, can engender resistance. Hence, if public sector organisations were not ready for the adoption and usage of e-government, then investment in e-government would be simply wasted. Rizzoni (1991) suggests that the most important factors for adoption success are organisational flexibility, strategic support for radical innovation, and high levels of entrepreneurial skills. Further, the adoption and implementation aspects of e-government have not been given adequate attention in the research literature. The literature reviewed by the researcher reveals that most e-government studies focus on the fundamental aspect of motivations, requirements, and effectiveness of e-government in public sector organisations, and most of the existing studies are not empirical but rhetoric in nature focusing on the transactional structure of the processes required in the e-government (Devadoss et al., 2003) whereas a number of voids exist in the literature regarding a comprehensive framework for the e-government adoption process in the public sector. Therefore, there is a need for developing an empirical framework that can be used as a tool by organisations' decision makers when considering the adoption of e-

government, and support the IT managers and researchers to better analyse and explore the aspects of e-government implementation, which is the aim of this research. Consequently, this chapter presents a conceptual framework for e-government adoption in public sector organisations. The proposed framework strategically outlines the implementation process of e-government in the form of a stage of growth model and identifies factors that influence the implementation process. A number of growth models have been proposed in the literature (e.g. Baum and Di Maio, 2000; Bonham *et al.*, 2001; Deloitte Research, 2000; McDonagh, 2002; Moon, 2002; Wimmer and Tambouris, 2002), but none of these has been empirically tested in a public sector organisation, except Layne and Lee (2001) who argued that their model is based on their observations and experience with e-government initiatives in the USA.

Since this chapter intends to explore the e-government adoption process in holistic view, the researcher believed that the existing stage of growth models proposed by the literature (e.g. Layne and Lee, 2001; Baum and Di Maio, 2000; McDonagh, 2002; Moon, 2002; Wimmer and Tambouris, 2002) did not address the factors that would influence the implementation process of each stage, which make the practising of such models in the fieldwork difficult. In addition, each stage in these models should represent a particular maturity level during the adoption process to enable government organisation to get the anticipated benefits, but the stage of growth models proposed in the literature did not identify the preparation tools, plans and organisational requirements that needed for the implementation process in order to reach a particular maturity level for each predetermined stage. For example, technical requirements, back office operational management changes, business models, the readiness of employees, the role of senior managers, and cultural and political considerations. Therefore, the researcher identifies an existing gap between the proposed stage of growth models in the literature and the process of e-government implementation that should be taken place in the public sector. Consequently, there is a need for another model that can explain the significant factors that influence the adoption process, and support the implementation requirements of each adoption stage. In doing so, the researcher integrates the proposed stage of growth model with the primary factors of the Technology-Organisation-Environment framework by Tornatzky and Fleischer (1990). The combination of this model to the stage of growth model will also provide a clear understanding of IT requirements, organisational considerations during the process of implantation and external impact towards the adoption of new e-government systems. The combination of these factors also helps to identify barriers and benefits of each adoption stage, which had led the researcher to incorporate another model, the benefits-barriers

model. As a result, the proposed conceptual framework can be used as an assessment model by IT specialists who can determine and evaluate the degree of maturity already reached by their organisation towards the implementation of e-government. The integration of these literature models (e.g. stage of growth, Technology-Organisation-Environment, and benefits-barriers) may provide a more holistic framework for e-government adoption, and therefore benefit the information systems research (More justifications for the selection of each proposed model will be provided in subsequent sections).

In this study, the researcher intends to develop a conceptual framework that can be applied in the specific context; the public sector in the Kingdom of Bahrain. The reason for this is that the validation of this framework would be placed in case organisations in the Kingdom of Bahrain, and as will be explained in the following sections, the government structure and decision-making level of public sector organisations in Bahrain are different from other countries. In doing so, the designing of the stage of growth model, selecting the Technology-Organisation-Environment model and benefits-barriers model to conceptualise the framework for e-government adoption are made exclusively to be adaptable and fit with the context of government organisations in Bahrain. Therefore, the proposed conceptual framework will help IT managers in Bahrain to reduce the confusion surrounding the e-government adoption process in their organisations. As well, it will also help them to understand the implementation process, identify the requirements of ICT tools, and highlight the importance of organisational readiness and impact of environment. Finally, the empirical validation of the proposed conceptual framework can also support the decision makers' level to draw up a vision statement and strategic action plan for government future in the information technology age by identifying key factors and stages for action. The empirical validation is performed by the researcher in the next empirical stage of this research, and hence the findings of the revised framework will be explained in Chapter 6.

3.4 Proposed Conceptual Framework for E-government Adoption

According to the previous discussion and Chapter 2, it becomes clear that the adoption of e-government in the public sector turns out to be a significant aspect in the IS area that has been demanded by many practitioners in the public sector and officials in government agencies. Since, e-government is a relatively new research area, there is a limited literature analysing its adoption process. Therefore, the researcher critically reviews the stage of

growth model that has been empirically applied to many ICT initiatives such as e-commerce, web services, and IT adoption that can aid the researcher's understanding, and hence be mapped onto e-government adoption. In addition, the researcher analyses some literature that identifies the most significant factors that support adoption of ICT innovations in organisations. As a result, the researcher will be able to adopt factors from other relevant areas in order to conceptualise a framework for e-government adoption.

In addition, the proposed framework also presents novel contributions at two levels. Firstly, at the conceptual level, the model incorporates factors identified in previous studies as influencing adoption of ICT projects. The researcher extends these works and adapts them to the e-government area by combining factors discussed in the normative literature, thus resulting in the development of an integrated model for the adoption of e-government. Secondly, the concepts of the proposed model can be used as a guide for the adoption of e-government projects in public sector organisations.

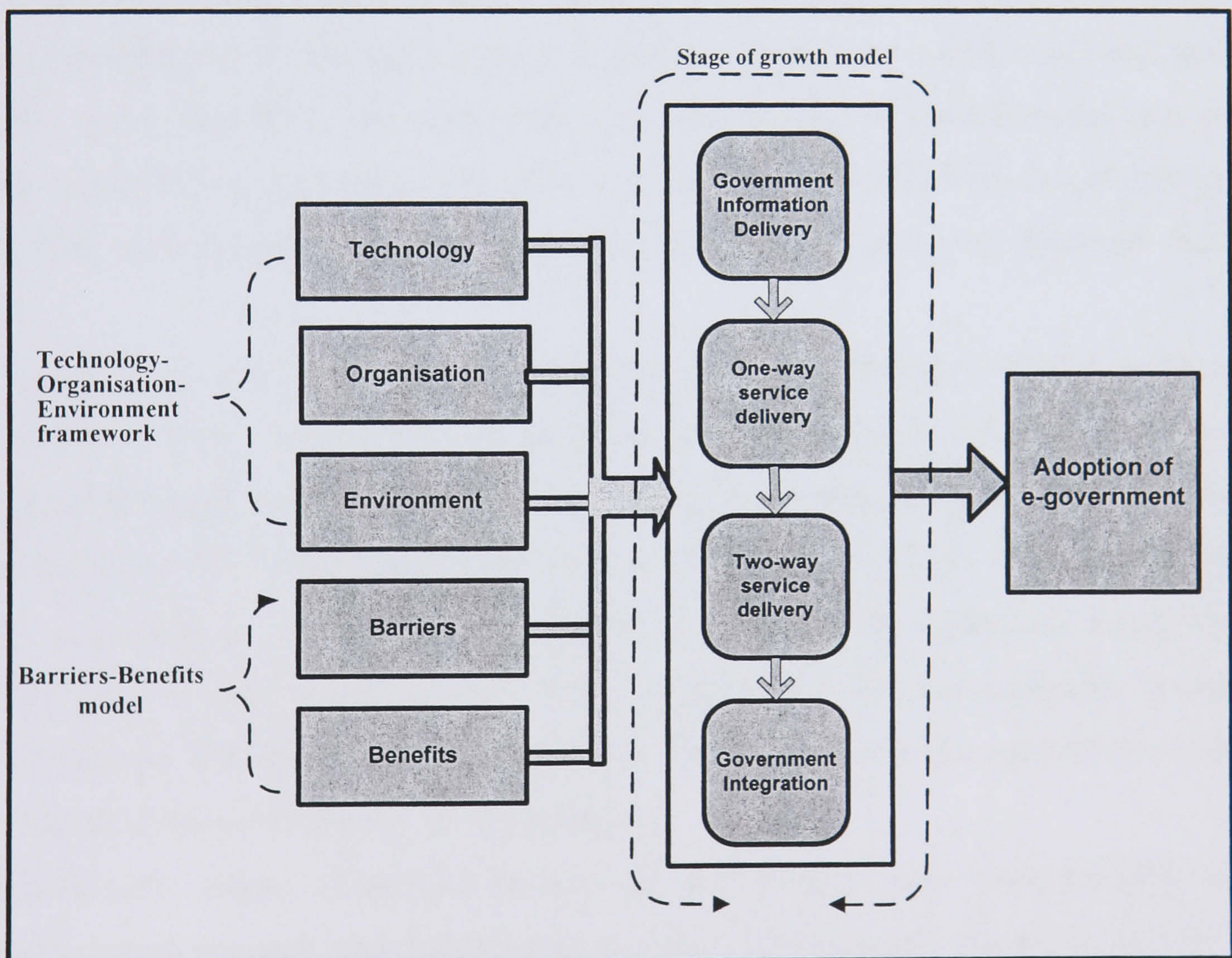


Figure 3.1: Proposed Conceptual Framework for E-government Adoption

The proposed conceptual framework shown in Figure 3.1 consists of three parts:

1. Stage of growth model,
2. Technology-Organisation-Environment model, and
3. Benefits-Barriers model.

The following subsections discuss and justify the three parts, respectively, that will conceptualise the proposed framework for e-government adoption.

3.4.1 Stage of Growth Model

Stage theory has proved to be particularly useful for developing knowledge in diverse fields during their formative periods. For example, these models have been used to describe a wide variety of phenomena such as the organisational life cycle, biological growth, and economic development of nations (King and Teo, 1997; Nolan, 1973).

Stage research models can be identified as sequences of events that occur during implementation, and like other process models, are valuable in describing how implementation processes unfold (Shaw and Jarvenpaa, 1997). They also focus on the time-ordering of events, and identifying the events and conditions necessary for certain outcomes to occur (Soh and Markus, 1995). In addition, Nolan (1973), in his study, justified using a stage model, as the latter provides a mechanism to determine the elements of systems that move through a pattern of distinct stages over a period of time, and those stages can be described. The paramount value of the stage of growth model is to provide help in identifying the context in which events occur, and show the causal linkages and temporal relationships among context, behavioural processes, and outcomes (Gallivan, 2001).

The stage of growth model plays a significant role in IT strategies' implementation at an organisation level. It presents organisational progress through a number of successive, identifiable stages. Each stage reflects a particular level of maturity in terms of the use and management of IT in the organisation (Nolan, 1973; Rogers, 1983). Nolan (1973) was the first to present a descriptive stage theory concerning the planning, organising and controlling of activities associated with managing the IT and computer resource in organisations. This research was motivated by the pressing need for a normative theory for the management and use of IT in organisations.

Consequently, stages of growth models are still widely used internationally in both organisational research and Information Systems (IS) research (Gallivan, 2001). While Nolan (1973) and then Rogers (1983) were the first studies to apply a stage model of organisational adoption and implementation, there have been many other literature stream applications (e.g. e-commerce, enterprise resource planning systems, web services) focusing on stage research models for understanding organisational implementation of IS over the years. Table 3.1 shows some empirical studies regarding the organisational

adoption of technological innovations that have critically used stage of growth model research in various IS applications.

Authors	IS Application
Chen (2003)	Adoption of Web services
Cooper and Zmud (1990)	IT adoption in Organisation
Doukidis <i>et al.</i> (1996)	Evaluation of IS planning
Gallivan (2001)	Organisation Development
Holland and Light (2001)	Enterprise Resource Planning System
King and Teo (1997)	Integration of business and IS planning
Kwon and Zmud (1987)	Implementation of IT innovation in Organisation
Nolan (1973)	Computer Resource Management
Rao <i>et al.</i> (2003)	E-commerce development
Rogers (1983, 1995)	Organisational innovation

Table 3.1: Research Studies applying Stage of Growth Models Empirically in IS Applications

In the context of e-government adoption, the stage of growth model can describe the logical evolution of e-government, each stage being better in some sense than the previous stage (Rao *et al.*, 2003), which can estimate the degree of progress a government has made towards the ultimate e-government status.

In order to translate this into practical form, the stage of growth model in terms of e-government adoption can involve a sequence of stages that starts with an initial web posting of basic government information, increasing over time in quantity, quality, and presentations. It is followed by the addition of some interactive features and capabilities for users. Then, some agencies progressively start offering more or less full transactional capabilities between constituents and a set of services. From within government, transit from electronic publishing to transactional status involves an increasingly elaborate set of complex changes in processes and structures of public sector organisation. Ultimately, stages conclude in the transformation of the government into a fully networked entity.

The motivations that have influenced the researcher for using the stage of growth model as part of the conceptual framework for e-government adoption can be summarised as follows:

- Unlike other ICT application projects, the e-government project is viewed as a strategic framework that could not be adopted and implemented in one stage and in a short period of time. It should be applied as an evolutionary process, with organisations going through a number of stages before they can fully realise the predicted benefits.

- Since e-government is a relatively new phenomenon, the staged model will allow public sector organisations to attract citizens' and businesses' trust and confidence to deal with an e-government portal more efficiently.
- Due to possible resistance that could appear in a public sector organisation from stakeholders during the implementation process, the staged model can address the organisational and cultural change during the ongoing process through various stages.
- Traditionally, the progress of any implementation of IT strategy in a public sector organisation context is slow-going, due to the bureaucratic process of government; the stages model will outline the structural transformation of public sector organisations as they progress towards an electronically-enabled organisation to understand the processes and outcomes.

Some studies, such as Atallah (2001), Baum and Di Maio (2000), Layne and Lee (2001) and Stowers (2004), use a common schema for classifying the evolution stages of an e-government project. The schema is based on the degree to which the properties of ICT have been used to enable the delivery of services electronically. In using this schema, as Table 3.2 indicates, there are multiple stages for adoption, which have been classified by several comparative studies. According to the table, some studies provide five stages (e.g. McDonagh, 2002; Moon, 2002), others provide six stages (e.g. Deloitte Research, 2000; Tambouris *et al.*, 2001), but most of the popular and recent studies develop four stages with a common concept and purpose, despite calling some stages by different names (e.g. Atallah, 2001; Baum and Di Maio, 2000; Bonham *et al.*, 2002; Chandler *et al.*, 2002; Layne and Lee, 2001; Sharma and Gupta, 2002; Stowers, 2004; Wimmer and Tambouris, 2002). Table 3.2 reviews the various classifications of the e-government-adoption staged models suggested by different authors.

Stages	Stage Names	References
Stage 1	■ Presence	<ul style="list-style-type: none"> ■ Atallah (2001) ■ Baum and Di Maio (2000) ■ Bonham <i>et al.</i> (2002) ■ Chandler <i>et al.</i> (2002) ■ Seifert and Petersen (2002) ■ Stowers (2004)
Stage 2	■ Interaction	
Stage 3	■ Transactions	
Stage 4	■ Transformation (Integration)	
Stage 1	■ Information	<ul style="list-style-type: none"> ■ Wimmer and Tambouris (2002)
Stage 2	■ Contracting	
Stage 3	■ Service Delivery and Payment	
Stage 4	■ Aftercare Phase	
Stage 1	■ Simple Information	<ul style="list-style-type: none"> ■ McDonagh(2002) ■ Moon (2002)
Stage 2	■ Electronic Submission	
Stage 3	■ Transactions	
Stage 4	■ Access to Government Single Portal (Integration)	
Stage 5	■ Integration between government and commercial applications and Political Participation	
Stage 1	■ Information Publishing / Dissemination	<ul style="list-style-type: none"> ■ Deloitte Research (2000) ■ Tambouris <i>et al.</i> (2001)
Stage 2	■ Official Two-Way Transaction	
Stage 3	■ Multi-Purpose Portals	
Stage 4	■ Portal Personalisation	
Stage 5	■ Clustering of Common Services	
Stage 6	■ Full Integration and Enterprise Transformation	

Table 3.2: E-government-Adoption Staged Models Suggested by Different Authors

One of the most empirical and effective findings among these studies is the model proposed by Layne and Lee (2001). This study provides a four stages of growth model for e-government adoption. The four-stage model, as shown in Figure 3.2, is Catalogue, Transaction, Vertical Integration, and Horizontal Integration. The effectiveness of this model compared to others is developed based on the authors' observations and experiences with e-government initiatives in the USA, and they claim that this growth model would be applicable to other governments. Figure 3.2 presents an outline summary of these stages and demonstrates the correlation between the complexities of suggested stages with different levels of integration.

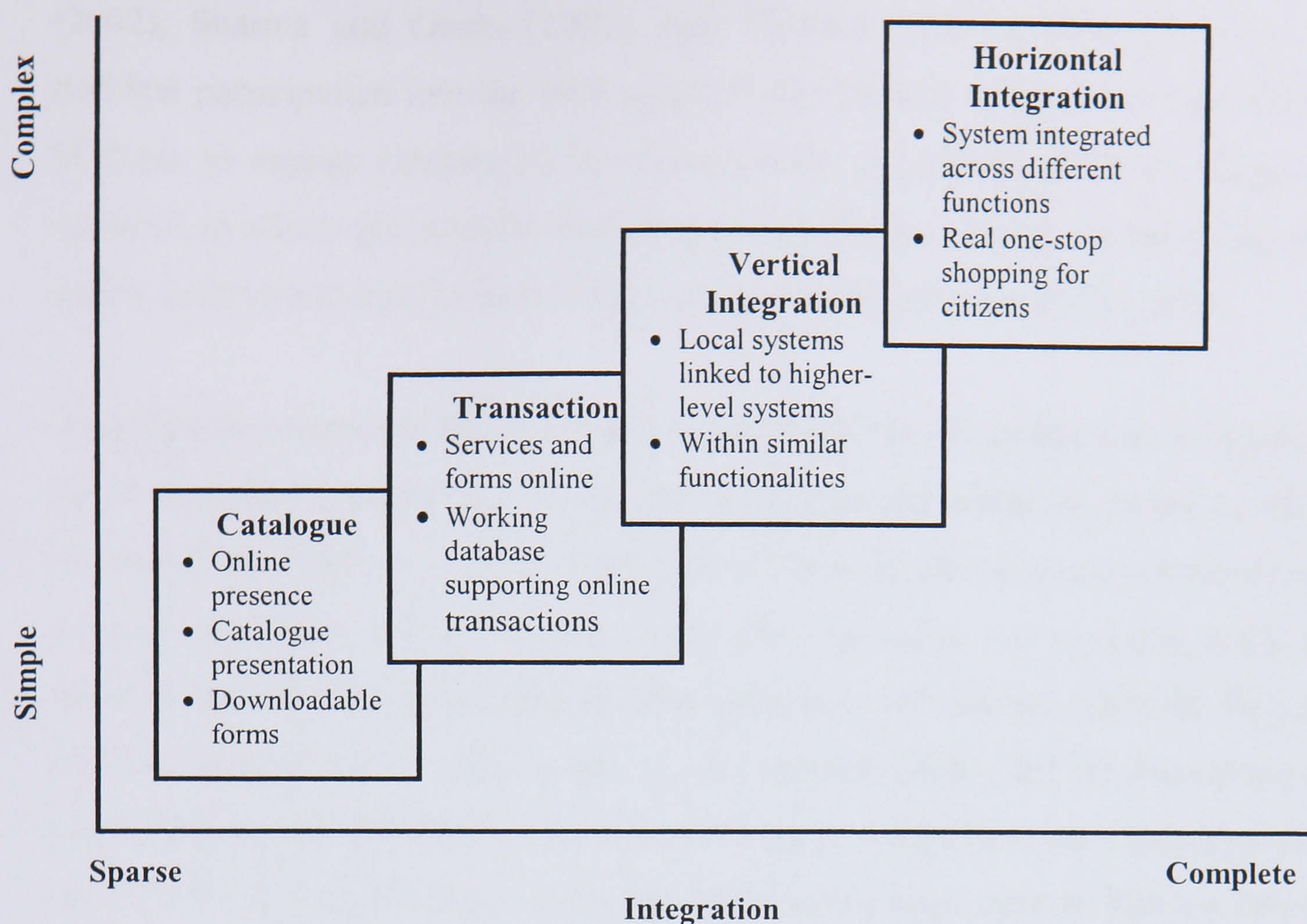


Figure 3.2: Description of E-government Development Stages
 Source: Layne and Lee (2001)

Although there have been differences between these models presented in Table 3.2 regarding the numbers or names of stages, the majority, such as Atallah (2001), Baum and Di Maio (2000), Deloitte Research (2000), Layne and Lee (2001), McDonagh (2002), Stowers (2004), and Wimmer and Tambouris (2002), agreed that the first two stages have the same purposes and tasks, which is providing basic information and services through the government website. Table 3.2 shows that most studies agree that Stage 1 is responsible for publishing and posting static information, and delivering government services. This stage leads to very simple interaction between citizens and governments. Stages 2 and 3 are responsible for a higher level of interaction between citizens and government staff through e-mail or online dialogue forum. The third stage of adoption, in particular, is capable of online payment and coordination with other governmental and non-governmental organisations for conducting transactions. At the final stages in Table 3.2 (i.e. Stages 4, 5, or 6), most scholars, such as Atallah (2001), Baum and Di Maio (2000), Chandler *et al.* (2002), Deloitte Research (2000), Layne and Lee (2001), Moon (2002), and Stowers (2004) discuss the transformation and full integration of government applications that lead to integrated government services, functions and transactions to operate across government organisation levels and departments, which enables citizens to access a single government portal.

In addition to the integration and transformation stages, some authors, such as Moon (2002), Sharma and Gupta (2002), and Wimmer and Tambouris (2002), incorporate political participation into the final stage of their model, which allows government to use IT tools to engage citizens in the development of political activities, programmes and services, in which government web sites include online voting, online public forums, and online opinion surveys for more direct and wider interaction with the public.

Although the staged models discussed above describe how public sector organisations can use the stages to adopt and implement e-government initiative, some of them are not consistent (see Table 3.2) as they progress towards an electronically-enabled organisation, where some stages are not relevant to the previous stage. For example, some studies did not give the interaction stage the required attention, for instance, Deloitte Research Group (2000), Tambouris *et al.* (2001), and Layne and Lee (2001) did not discuss the interaction stage, and jumped directly to the transaction stage; others discussed interaction but did not identify the ICT applications, tools, and organisation requirements that are needed to meet this stage. The significance of this stage is that to provide a higher level of information, it needs technology that can be used to communicate public sector organisations to citizens through providing dynamic information, online application forms, and establishing channels with government officials, which can be considered as the beginning of the e-government initiative revolutionary entity that changes the way people interact with their government. Moreover, the consequence of this stage is to increase the confidence in government services provided through the Internet, in order to have the more complex transactions between government and citizens that might be provided in future (for details of this stage, see Table 3.3). In addition, these studies did not discuss what factors promote and inhibit e-government adoption and implementation at a particular stage. Moreover, these staged models have not been empirically tested in terms of adoption of e-government in public sector organisations.

Therefore, the proposed stage of growth model in this research will be supported by the Technology-Organisation-Environment model of Tornatzky and Fleischer (1990) to discuss the technological, organisational and environmental issues that can be raised gradually along with adoption stages, whereas most studies (e.g. Atallah, 2001; Baum and Di Maio, 2000; Bonham *et al.*, 2002; Chandler *et al.*, 2002; Layne and Lee, 2001; Sharma and Gupta, 2002; Stowers, 2004; Wimmer and Tambouris, 2002) did not give these issues the required attention (for more details on these issues see Section 3.4.2). Also, the proposed model will fill the gaps of some stages in particular studies, such as the

interaction stage, as discussed above, and identify the key characteristics of each stage, based on ICT.

Furthermore, the researcher intends to validate empirically the proposed stage of growth model in public sector organisations to address the following research questions that have not been answered in the literature:

- To test whether the proposed stages fit the actual events and processes in case organisations, the proposed theoretical stage of growth model will be integrated with the Tornatzky and Fleischer (1990) framework.
- To explore what factors promote and what factors inhibit the implementation process of e-government, along with the proposed stages.
- To explore the integrity and consistency of stages by identifying the degree of interconnection and relationship between each stage.
- To determine the significance of the sequence of implementation of the stages of growth model, and whether it is essential to complete the implementation of the previous stage in order to start the next stage, and to work through all of the stages, or to omit some.

Accordingly, the researcher proposes a four-stage model that characterises the adoption stage of growth model of an e-government initiative. These four stages, as highlighted in Figure 3.3, are government information delivery, one-way service delivery, two-way service delivery, and government integration.

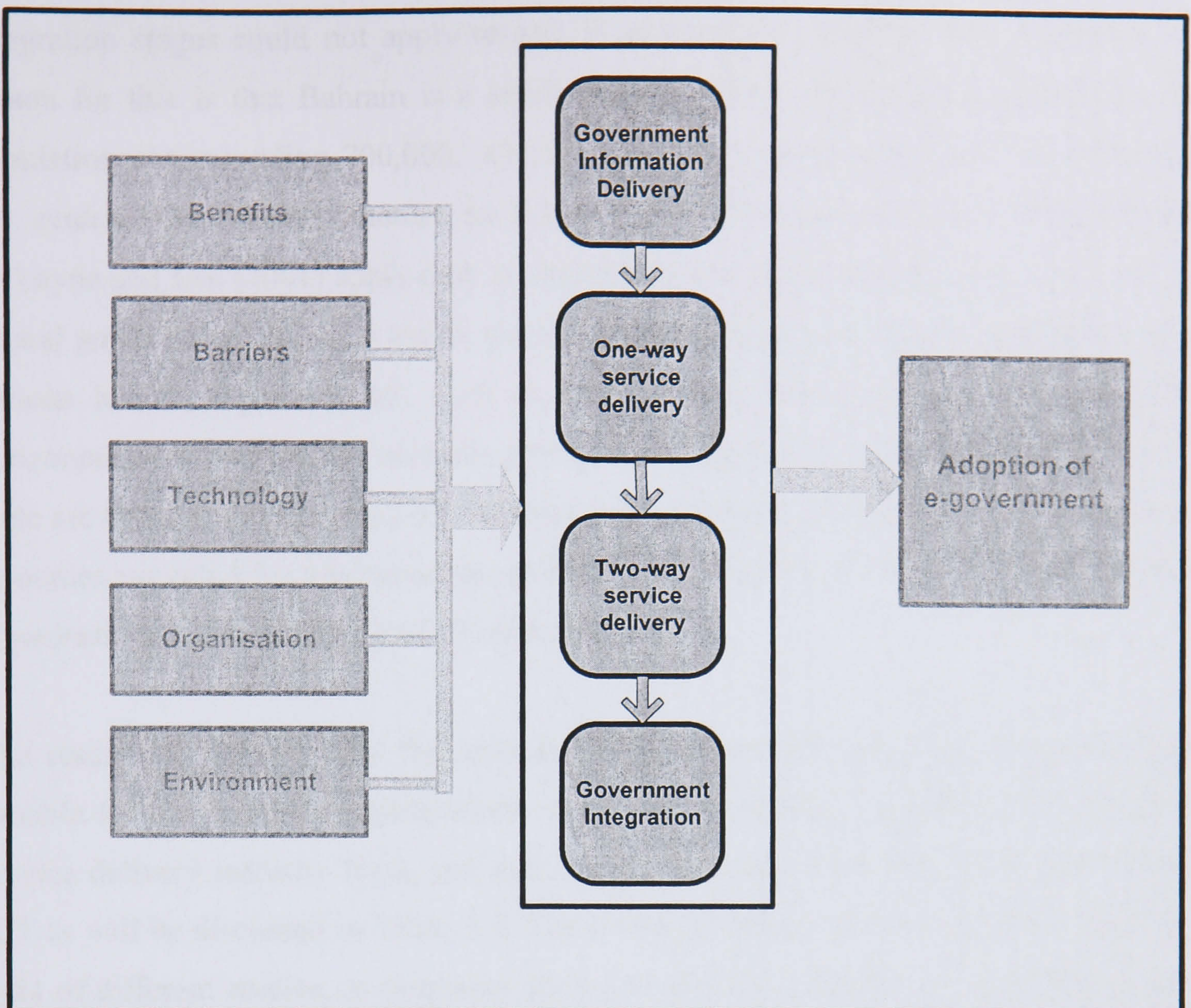


Figure 3.3: Proposed Stage of growth model (Highlighted)

The proposed staged model extends similar work done by studies such as Baum and Di Maio (2000), Layne and Lee (2001) and Stowers (2004), which are most relevant to the proposed work, since the Layne and Lee (2001) growth model, as mentioned above, has been proposed based on experiences and observations in the USA public sector context. However, the researcher identifies some limitations in the latter model; they did not incorporate the one-way service delivery stage or what some authors call the interaction stage in their model (Stage 2), as discussed above, whereas this stage in particular is viewed as the key stage for implementing two-way service delivery between citizens and government. The significance of this stage is that it links information displayed in the government information delivery stage (Stage 1) with inventory data and search capabilities, as will be explained in Table 3.3. Additionally, the Layne and Lee (2001) model proposes two types of integration, Vertical and Horizontal, represented as stages 3 and 4, respectively, as illustrated in Figure 3.2. While the researcher will validate the proposed conceptual framework of this work in the context of the Kingdom of Bahrain, which is a different context from that presented by Layne and Lee (2001) (i.e. USA), these

integration stages could not apply to and fit government organisations in Bahrain. The reason for this is that Bahrain is a small country with a limited geographical area and population not exceeding 700,000, which leads to having only one level of government (i.e. central government), whereas the Horizontal and Vertical integration stages proposed by Layne and Lee (2001) apply only in multiple levels of government (e.g. local, city, and central government). In other words, the aim of these stages is to provide integration across various levels of government, such as federal, state and local, and also connections horizontally across different services provided by organisations (see Figure 3.2). Further, there are additional differences between these two contexts, such as the amount of financial resources provided for e-government adoption, the structure and readiness of government organisation, and the maturity of IT infrastructure.

The researcher believes that the proposed stage of growth model in this framework is flexible for public sector organisations in Bahrain to adopt it, regardless of its electronic service delivery maturity level, and each successive stage raises the strategic potential of ICT as will be discussed in Table 3.3. The researcher analyses the suggested stages in the light of different studies, as discussed above, to provide a consistent theoretical stages of growth model, and uses influential factors from the Tornatzky and Fleischer (1990) framework, as discussed in the next section, which leads to conceptualisation of an integrated framework for e-government adoption. However, this stage model does not mean that all government organisations go through these stages or that they undertake them in this particular sequence. The commonality of this model will allow the researcher to determine organisations' progress based on how far along they are in incorporating various website features. The empirical validation of the proposed four-stage model will verify whether the proposed implementation sequence of stages is obligatory, and also determine the integrity of the model.

Table 3.3 presents the description of the proposed four-stage model and identifies key characteristics of each stage based on IS/IT implementation.

E-government Stages		Description	Characteristics
Stage 1	Government information delivery	Posting static information through government website. Significance of this stage is a key for e-government initiative, which describes primary services and transactions provided by government organisations, as well as declares instructions and procedures of government operations.	<ul style="list-style-type: none"> ▪ Creating government website which makes government general information and services available online ▪ Introducing Internet and intranet to organisation ▪ Providing information about government organisations, such as organisation outline, hours of operation, mailing address, proposed legislation, and phone numbers. ▪ Maintaining web pages to update policies and procedures ▪ Reducing cost of government expenditure such as stationery and communication ▪ Reducing workload of front-office employees ▪ Requires no advanced technology tools and additional management support
Stage 2	One-way service delivery	Providing higher level of information that communicates public sector organisations to citizens through providing dynamic information, online application forms, and establishing channels with government officials. It provides primary preparation in terms of technical for organisation and psychological for citizens.	<ul style="list-style-type: none"> ▪ Providing service passively, not exchanging information between government and public ▪ Facilitating information retrieval from organisation databases ▪ Increasing use of intranet to facilitates file transfers ▪ Incorporating ICT tools such as e-mail systems, electronic records' management and data-transfer technologies into its websites ▪ Introducing search engine to allow key word searching ▪ Providing citizen interactive conversations through e-mail systems or online forums with constituents or government officials ▪ Downloading application forms from government server ▪ Viewed as grounding stage for two-way service delivery ▪ More complex than Stage 1- as Figure 3.4 illustrates
Stage 3	Two-way service delivery	Vehicle of complete electronic services from and to citizens, which can deliver entire government transaction electronically while sitting in front of the computer. For example, citizens can fill tax returns, pay fines, and apply for vehicle registration.	<ul style="list-style-type: none"> ▪ Facilitating high-level of two-way communication between citizens and government, from initial processes till the payment for service fee. ▪ Connecting internal government systems to online interfaces ▪ Allowing citizens access to organisation back-office to complete transaction processing ▪ Embedding with advanced ICT tools to extend organisation intranet to extranet ▪ Reprogramming databases to be linked online into website ▪ Maintaining security and confidentiality mechanisms to provide secure transactions ▪ Playing strategic role in achieving e-government objectives ▪ More complex, and level of interactivity higher than in Stage 2- as Figure 3.4 illustrates
Stage 4	Government integration	About transformation of government organisations' processes and re-engineering internal business processes, as well as integrating public information and services across organisations and departments. Implies public services accessible through single window, even if provided by different public sector organisations and departments.	<ul style="list-style-type: none"> ▪ Providing one-stop government portal ▪ Connecting organisations across different levels of departments ▪ Interchanging results of transactions from one organisation system with another system ▪ Using full capabilities of ICT applications to transform how government functions are organised and executed. ▪ Integrating shortened gap between front and back office. ▪ Implementing applications' integration of heterogeneous databases located in different sites ▪ Integrating external supply and distribution chains with government ▪ Viewed as critical long-term success plan of e-government implementation ▪ Most advanced and expensive stage of e-government adoption model- as Figure 3.4 illustrates

Table 3.3: Proposed Stages of E-government Adoption Model

In Table 3.3, it becomes clear that the proposed stage of growth model can be described as the logical evolution of e-government, involving development of different stages, each later stage being more complicated in some sense than the previous stage because of demand for sophisticated ICT tools, cost, top management support, and high IT skills. Hence, improving effectively the functionalities and facilities provided to citizens along with the development of stages, as shown in Figure 3.4, which summarises and illustrates the degree of development of e-government performance in relation with functionality associated with each single stage.

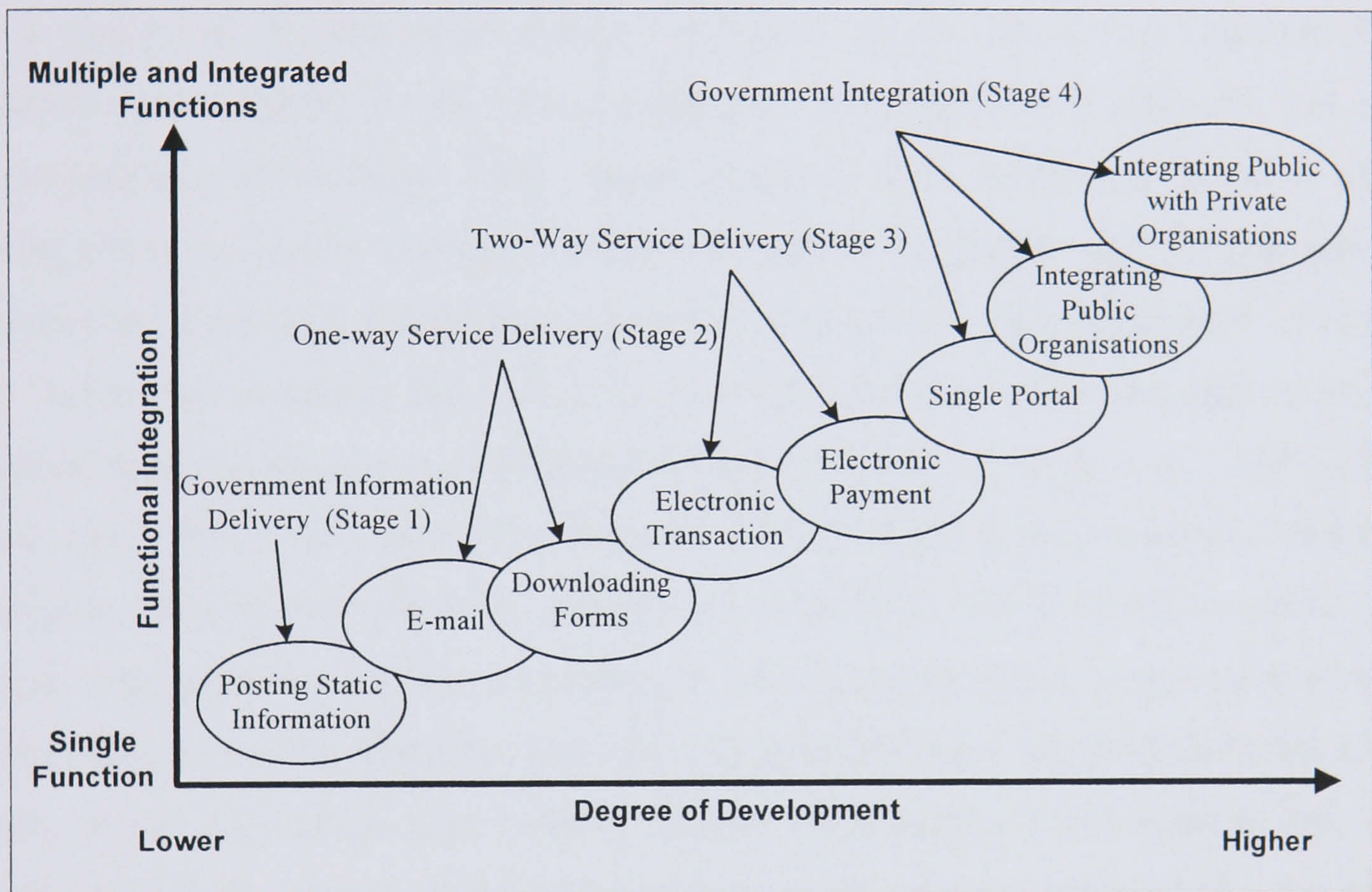


Figure 3.4: Development of E-government Performance in Relation with Functional Integration

3.4.2 Technology-Organisation-Environment Framework

Many of the IT innovation studies are either application-specific (e.g. ATM, EDI, ERP, Database) or related to end-user computing (e.g. spreadsheet, e-mail, personal computer, laptop). In addition, as discussed in Section 3.2, many innovation studies have related to the perspective on the acceptance and adoption of technology at the individual level, such as consumers, users, and households (e.g. Technology Acceptance Model by Davis, 1989), whereas little has been done to study the adoption of ICT innovations that affect the entire organisational level, in terms of computing infrastructure, business process, top management support, organisational behaviour, and cultural issue. Among these are Iacovou *et al.* (1995), Ling (2001), Nolan (1973), Rogers (1983), Thong (1999), and Tornatzky and Fleischer (1990). Nonetheless, the Iacovou *et al.* (1995) and Ling (2001)

studies identify factors that influence the adoption of IT by focusing on perceived benefits, organisational readiness, and external pressure contexts, which is nearly similar to the general framework in IT innovation studies suggested by Tornatzky and Fleischer (1990). However, the studies of Iacovou *et al.* (1995) and Ling (2001) have been identified and applied in small organisations which do not comprehensively address the different characteristics at an organisational level. Further, the validity and applicability of these models to complex technological innovations in public sector organisations are still questioned by researchers.

In a review of IT innovation studies, Fichman (1992) argues that classical diffusion variables are unlikely to be strong predictors of adoption and diffusion for complex organisational technology. This study suggests that additional factors, either as independent or control variables, should be added. Frambach and Schillewaert (2002) support this argument, and emphasise that it is important for the organisation to understand the factors that influence their adoption decision processes. Therefore, the researcher has studied much literature on adoption of IT innovations (e.g. Ang *et al.*, 2001; Chau and Tam, 1997; Kuan and Chau, 2001; Scupola, 2003; Tornatzky and Fleischer, 1990) to refine and tailor factors that match the context of application, which in this research is public sector organisations, and are equivalent to the characteristics of e-government adoption stages. The researcher identifies from the literature that most adoption frameworks for the study of ICT innovation in a complex context like a public sector organisation, which is multi-disciplined, require additional factors such as external environment, the nature of technology in the organisation, and the capabilities of the organisation, as several studies consider them as main explanatory factors. These factors are similar to those explained in the three contexts of the Tornatzky and Fleischer (1990) model.

Consequently, the researcher proposes to use the Technology-Organisation-Environment model of Tornatzky and Fleischer (1990) as the second part to be added to the proposed conceptual framework for e-government adoption. This framework will incorporate the proposed stage of growth model that has been discussed above, to be supported by the technological, organisational and environmental issues that can be raised gradually along with growth of adoption stages, as shown in Figure 3.5.

Based on the ICT/ IS adoption literature review (Cahill *et al.*, 1990; Chau and Tam, 1997; Kuan and Chau, 2001; Zhu *et al.*, 2002), the Tornatzky and Fleischer (1990) framework

has a theoretical basis of IS adoption, empirically tested, and has been found a useful starting point for understanding the adoption of technological innovations which can apply to any type of organisation or unit of analysis. One of the contributions for the Zhu *et al.* (2002) study is the usefulness of the Tornatzky and Fleischer (1990) model, which identifies facilitators and barriers in their study of e-business adoption. Zhu *et al.* suggest that this model could be applied by researchers to study other IS adoption in different settings. Cahill *et al.* (1990) found that the unique combination of these three categories of factors- environmental, organisational, and technological – gave greater explanatory power for the successful use of IT in various government settings than any one single category of factors.

Other authors have the same experience (e.g. Ang *et al.*, 2001; Scupola, 2003), using the Technology-Organisation-Environment model effectively in their empirical research. Table 3.4 illustrates selections of critical IS domains that have been empirically tested using the Technology-Organisation-Environment of Tornatzky and Fleischer (1990) model.

IS domain	Empirical References
IT usage in public sector	Ang <i>et al.</i> 2001
Open systems adoption	Chau and Tam 1997
EDI adoption	Kuan and Chau 2001
E-commerce adoption	Scupola 2003
E-business adoption	Zhu <i>et al.</i> 2002

Table 3.4: Research Studies using Tornatzky and Fleischer (1990) Framework Empirically in Information Systems Domains

Accordingly, the researcher believes that Tornatzky and Fleischer (1990) model is the proper one to explain the factors influencing e-government adoption in public sector organisations, which is highlighted in Figure 3.5, and the reasons are summarised below:

- It highlights the three influential contexts in public sector organisations that play a significant role in e-government adoption (i.e. organisational, technological, and environmental).
- Implementation of e-government requires several information and communication technologies infrastructure, integrated systems and applications that enable each adoption stage to achieve its objective.
- E-government offers an opportunity to reengineer the organisations' management process and operations, thus the organisational level requires an analytical model

that focuses on structure, strategy, and individual attitudes in those organisations and their roles in each adoption stage.

- The success of adoption of e-government depends on the external environment, in terms of willingness of citizens and business to interact with government electronically, as well as the cooperation and competition of other organisations in government.
- Such factors help the researcher to analyse the adoption maturity of each stage of growth that takes place in public sector organisations.
- As any ICT adoption, the adoption of e-government offers many benefits to adopters, and at the same time, they experience some barriers during the implementation process. The combination of these factors can help to identify barriers and benefits of each adoption stage.

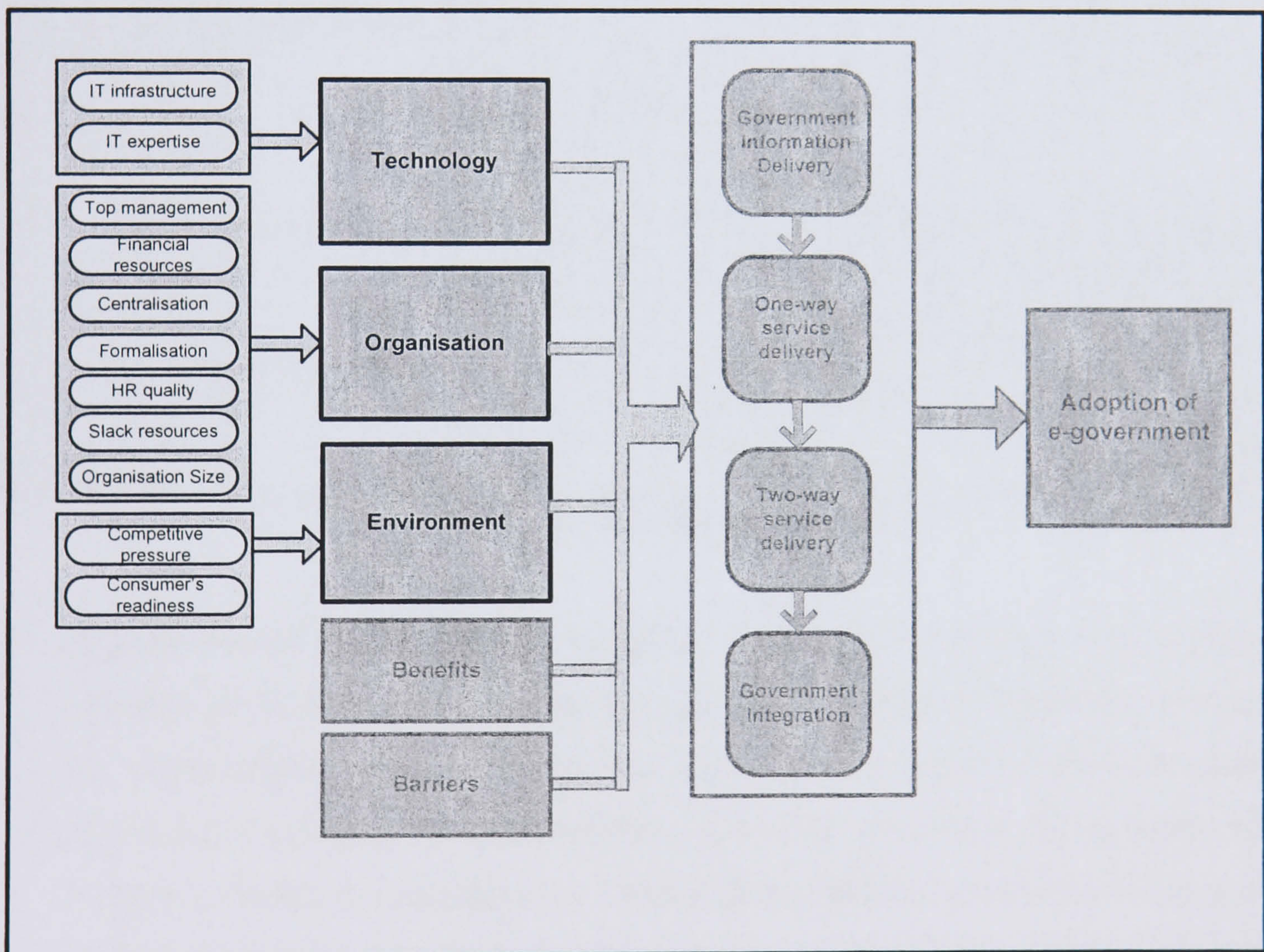


Figure 3.5: Technology-Organisation-Environment Model Associated with Sub-factors (Highlighted)

The model shown in Figure 3.5 includes three key factors affecting the adoption and implementation process of e-government. The researcher links each key factor with other sub-factors, which can help to explain the intention of the key factors in the light of e-government adoption in the public sector.

1. **Technological factor.** This represents the pool of technologies available for adoption by the organisation. Since e-government requires a substantial degree of technical competence to ensure smooth and efficient adoption, the question can be viewed as the degree of match between the characteristics of the e-government innovation and the current technological setting of an organisation. As illustrated in Figure 3.5, this factor encompasses two sub-factors that address the explicit needs of e-government adoption in the public sector, and Table 3.5 describes these sub-factors.

Key Factor	Sub-factors	Description	Reference
Technological Factor	IT infrastructure	Combination of hardware and software available in the organisation that will provide secure electronic services to citizens, businesses, and employees. It also automates business processes within the organisation and enables Internet-related businesses. In doing so, this factor may cover entities such as web portal, payment engines, application development suites, integration middleware directory services, customer relationship management software, and the servers needed to support these entities. This factor can be measured as complexity of the existing IT infrastructure, organisational IT capabilities, satisfaction level with existing systems, the reliability of communication and networks infrastructure, and degree of formalisation of systems development and management.	Ang <i>et al.</i> (2001) Caudle (1991) Chau and Tam (1997) Kuan and Chau (2001) Lee <i>et al.</i> (2003) Thong (1999)
	IT expertise	This factor can be measured as training strategy in organisation and availability of qualified IT staff. Training strategy is important since it closes skills and knowledge gap in using advanced technology that might cover project management, change management, and develop IT skills for using new applications and systems that support e-government implementation.	Chircu and Kauffman (2000) Heeks (1999) Lee <i>et al.</i> (2003) Norris (1999) Thong (1999)

Table 3.5: Technological Sub-factors

2. **Organisational factor.** This is a source of structures, processes and attitudes that constrain or facilitate the adoption of e-government. Many dimensions can be part of the organisational context, which can influence the implementation process of e-government, as Figure 3.5 demonstrated, such as the role of top management, financial readiness, degree of centralisation, formalisation, quality of human resources, amount of slack resources available internally, and size of organisation. These dimensions are described in Table 3.6.

Key factor	Sub-factors	Description	Reference
Organisational Factor	Top Management	Decision of e-government adoption typically involves top management of an organisation. The support and active commitment of top management in organisation plays a significant role toward the adoption process of e-government. Top management can be measured as level of education and knowledge of leaderships, the technical and management skills, and the age of managers. This factor is identified as the predictor of successful adoption of e-government in public sector.	Brudney and Selden (1995) Kraemer and Dedrick, (1997) Serour and Henderson-Sellers (2002) Thong (1999)
	Financial Resources	Degree to which financial resources are available to fund e-government project, such as staff training cost, consultancy cost, implementation for any subsequent applications and tools, maintenance cost and management efforts' cost.	Dembla <i>et al.</i> (2003) Iacovou <i>et al.</i> (1995) Irani (2002)
	Centralisation	Degree to which power and control in an organisation system are concentrated in the hands of relatively few individuals, while in decentralised organisation structures, decision-making is distributed across different management levels. Since decision-making for adoption of e-government is typically concentrated at top level of management, hence degree of centralisation will influence speed of implementation process.	Bretschneider and Wittmer (1993) Grover (1993) Lee <i>et al.</i> (2003) Rogers (1995)
	Formalisation	Degree to which organisation emphasises following rules, norms, formal processes and procedures in role performance of its members. In other words, it is the bureaucratic structure and is a very common phenomenon in public sector organisations, which has been found to be associated with IT adoption in public sector organisations.	Bretschneider and Wittmer (1993) Lee <i>et al.</i> (2003) Rogers (1995) Serour and Henderson-Sellers (2002)
	Human Resource Quality	Degree to which government employees possess relatively high level of knowledge and expertise, usually measured by the range of occupational specialities and their degree of professionalism expressed by formal training and education.	Brudney and Selden (1995) Serour and Henderson-Sellers (2002)
	Slack Resources	Degree to which uncommitted resources are available internally to an organisation. There are three types of organisation resources: marketing, technological, and financial. Technological and financial resources are both relevant in context of e-government adoption.	Bretschneider and Wittmer (1993) Damanpour (1991) Iacovou <i>et al.</i> (1995) Rogers (1995)
	Organisational Size	Degree to which complex processes, information, and services in organisation are provided to citizens. Size of organisation reflects two characteristics: volume of services directly provided to citizens and business, and number of employees.	Brudney and Selden (1995) Kraemer and Dedrick (1997) Norris (1999) Rogers (1995)

Table 3.6: Organisational Sub-factors

3. **Environmental factor.** This is the arena in which the organisation conducts and influences its consumers. One of the primary reasons for e-government adoption is that organisations could be driven towards it by the actions of competitors, as well as it establishes a connection with other organisations for better collaboration and the expectations of citizens and business. The literature shows that some public sector organisations are affected by the actions taken by other organisations in the adoption of

innovations that are similar to them in terms of size and budgetary constraints. This factor, in this research, includes two types of sub-factors that would influence the implementation process of e-government, competitive pressure and consumers' readiness, and which are described in Table 3.7.

Key factor	Sub-factors	Description	Reference
Environmental Factor	Competitive Pressure	Degree of pressure from competitors who are an external power pressing an organisation to adopt e-government in order to avoid competitive decline. Public sector organisation may feel pressure to adopt the e-government when it sees more organisations in the government adopting e-government and therefore feels need to adopt in order to remain competitive.	Frambach and Schillewaert (2002) Icovou <i>et al.</i> (1995) Lee <i>et al.</i> (2003) Mehrtens <i>et al.</i> (2001) Themistocleous and Irani (2002)
	Consumers' Readiness	Combination of consumer willingness (e.g. citizens, business, government employees) and Internet penetration. Consumers' willingness reflects extent to which consumers accept online services, interaction and transaction. Internet penetration measures diffusion of PCs and Internet connections in population.	Crook and Kumar (1998) Frambach and Schillewaert (2002) Grove (1993) Teo <i>et al.</i> (1995)

Table 3.7: Environmental Sub-factors

3.4.3 Benefits-Barriers Model

An extensive literature review of factors affecting the adoption of IT (e.g. Icovou *et al.*, 1995; Mehrtens *et al.*, 2001; Themistocleous and Irani, 2002) reveals that perceived barriers and benefits are one of the most important factors affecting the IT adoption process. This literature suggests that an awareness of potential/perceived benefits leads to greater adoption (see Chapter 2, Section 2.7).

In the context of this research, e-government, as discussed in Chapter 2, is a novel approach in organisational infrastructure development, in which quantification of perception of possible barriers and benefits related to it may lead towards more understanding of the implementation process.

Consequently, the researcher believes that benefits and barriers associated with e-government should be considered as factors that influence the implementation process of e-government, as Figure 3.6 shows. This is also reflected in the literature review results derived from Chapter 2, and also in the models proposed by Themistocleous and Irani (2002) and Icovou *et al.* (1995).

As indicated in Chapter 2, Section 2.8, there are a number of barriers experienced in public sector organisations that prevent the realisation of anticipated benefits and degrade

successful adoption of e-government projects. On the other hand, there are potential benefits and motivations arising from e-government literature that could promote the top management to adopt it (see Chapter 2, Section 2.7). However, these benefits and barriers had not been identified empirically in the literature, so the researcher validated them empirically, as reported in Chapter 5 of this thesis, and explored the significance of these factors in the implementation process of e-government.

The influence of barriers and benefits factors on the e-government adoption process is highlighted in Figure 3.6 and explained below.

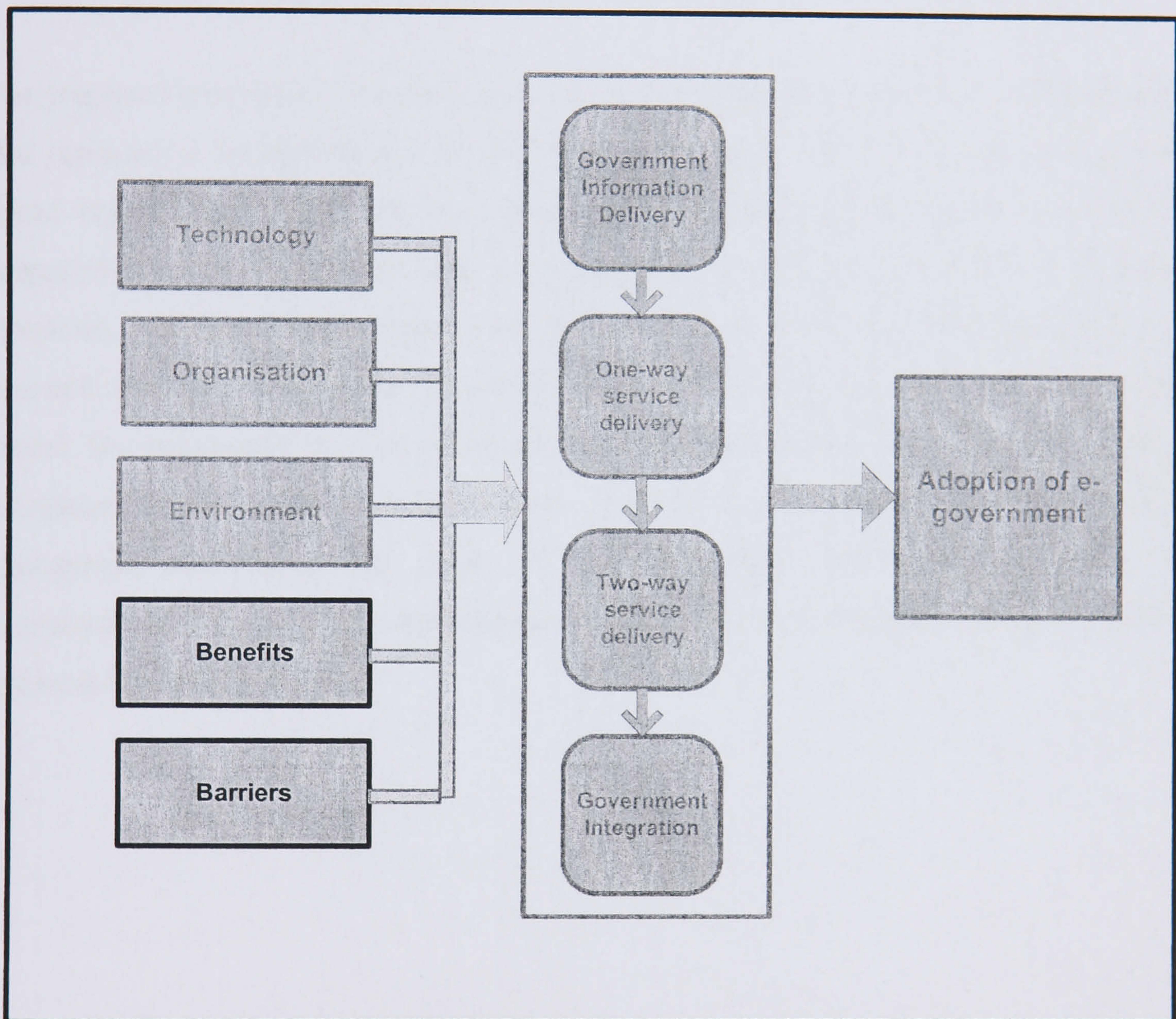


Figure 3.6: Benefits-Barriers Model (Highlighted)

Perceived Benefits. These refer to the level of recognition of relative advantage that e-government could provide to the organisation. The degree of relative advantage can be measured as economic profitability, social prestige, improved business process efficiency, or other benefits. For example, innovations that save money over existing methods have been found to diffuse more rapidly due to their perceived economic advantage (Icovou *et al.*, 1995; Mehrtens *et al.*, 2001).

Perceived Barriers. These refer to the level of factors that inhibit the adoption of e-government or impact on the organisation, which negatively influence the implementation process in each adoption stage of the proposed model. The barriers could vary from one stage to other because each stage requires different ICT tools, organisation capabilities, and strategic action plan. As discussed in Chapter 2, such barriers can include shortage of financial resources, resistance from department managers, lack of IT expertise, inappropriate ICT infrastructure, and security and privacy issue.

3.5 Proposed Strategy for Validating Conceptual Framework in Fieldwork

The proposed conceptual framework presented above has integrated three different models that represent a comprehensive model for e-government adoption at the level of public sector organisations. Thus, the next stage of this research was to test the validity of the proposed framework in real case organisations, as will be discussed in Chapter 5. However, not all of the proposed factors have been tested and validated during this research due to the limitation of resources and feasibility, complexity of the proposed model, the unavailability of required data, and time constraints. As Figure 3.7 shows, the validation of the conceptual framework included the central parts of the proposed conceptual framework, the stage of growth model, technological factors, three organisational factors, and competitive pressure of the environmental factor, in addition to the benefits-barriers model.

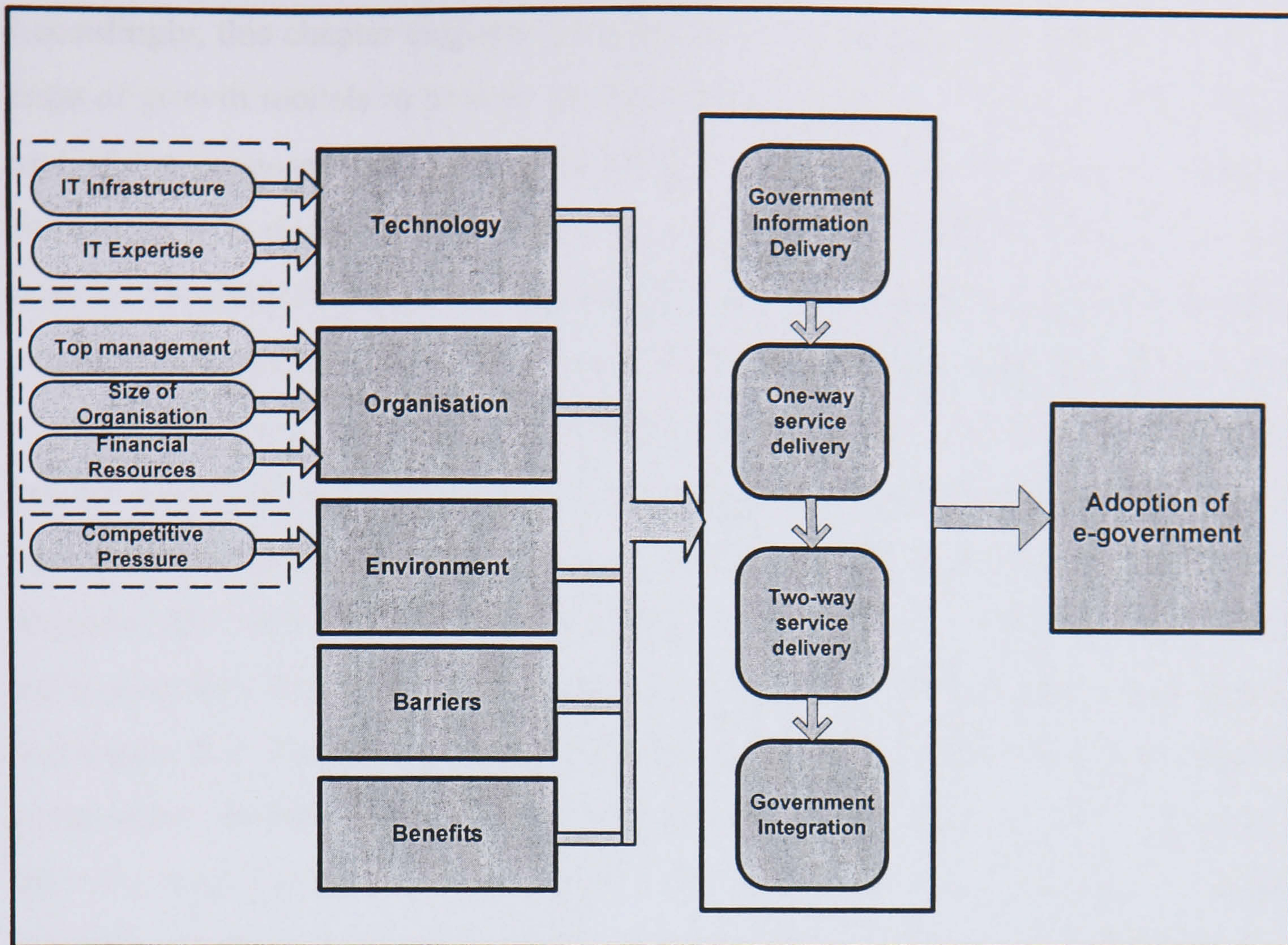


Figure 3.7: Proposed Validated Parts of Conceptual Framework for E-government Adoption

The researcher validated whether the proposed stages of growth model can fit the actual events and processes of case organisations. Therefore the researcher identified the significance of the proposed four stages along with the implementation process of e-government within case organisations. This led the researcher to verify the necessity of sequence, confirm the consistency, and determine the complexity of each adoption stage, and hence modify the proposed framework for e-government adoption accordingly. The researcher also determined the degree of impact of the barriers-benefits model on the e-government adoption process, and hence identified the factors that promote or inhibit the implementation process of e-government. In addition, the researcher validated the proposed factors and identified any additional factors derived from the empirical data.

3.6 Conclusions

This chapter analyses the normative literature in conjunction with researcher perspectives to establish a conceptual framework for e-government adoption. The researcher identifies a gap in the literature which is the absence of theoretical models for e-government adoption in public sector organisation.

Accordingly, this chapter explores the adoption of e-government by analysing the existing stage of growth models to propose an appropriate model that can be used as a significant part of the proposed conceptual framework for e-government adoption. However, the stage of growth model is not a sufficient model for e-government adoption, so there is a need for further models that can identify factors that influence the adoption process, and support the implementation of each stage. Therefore, the researcher integrates the proposed stage of growth model with the Tornatzky and Fleischer (1990) model and the benefits-barriers model in order to conceptualise a strategic framework for e-government adoption. The researcher assumed that the proposed stage of growth model is flexible enough for an organisation to adopt it regardless of its electronic service delivery maturity. Furthermore, each successive stage raises the strategic potential of ICT. Hence, the researcher proposes four stages that characterise the adoption stage of growth model. These four stages are (1) government information delivery, (2) one-way service delivery, (3) two-way service delivery, and (4) government integration. The value of this stage of growth model is that it provides a road map for understanding the evolution of e-government in public sector organisations. This can help organisations understand the implementation process and provide guidance on how to move towards realising the potential of the e-government initiative.

The researcher identifies from the literature that most adoption frameworks for the study of ICT innovation in a complex context like public sector organisation require additional factors such as external environment, the nature of technology in the organisation, and the capabilities of the organisation, as several studies consider them as main explanatory factors. These factors are similar to those explained in the three contexts of the Tornatzky and Fleischer (1990) model.

The Tornatzky and Fleischer (1990) model includes three factors affecting adoption and implementation of e-government innovation: (1) Technological, (2) Organisational, and (3) Environmental. This model has a solid theoretical basis, empirically tested, and has been found a useful starting point for understanding the adoption of e-government innovations, and can apply to any type of organisation or unit of analysis.

In addition, the critical review of literature reveals that perceived barriers and benefits are one of the most important factors affecting the IT adoption process. Hence, the researcher believes that both perceived benefits and barriers in government organisations influence the decision-making for e-government adoption, and thereby the researcher proposes that

benefits and barriers associated with e-government should be considered as factors that influence the adoption of e-government.

The integration of these models - stage of growth, Tornatzky and Fleischer (1990), and barriers-benefits model- that leads to formulation of a strategic framework for e-government adoption will help to reduce the confusion surrounding the process of implementation of e-government in public sector organisations. As a result, it will accelerate and facilitate this process of e-government implementation by identifying the fundamental adoption stages and their needs.

The conceptual model is a starting point towards contribution of this thesis to the body of knowledge, not an end product. Any assumptions made in the conceptual framework will therefore be validated after the empirical inquiry in Chapter 6.

Chapter 4

Research Methodologies

As indicated in Chapter 3, the validity of the proposed conceptual framework for e-government adoption requires empirical data to become a novel model. In order to collect these data from fieldwork successfully, the way to collect empirical data for achieving the aim of this dissertation should be described. Hence, this chapter presents the selection of the proper research methodology, strategy and protocols that will be used during the empirical investigation part of this research. In doing so, the justification is given for the Interpretivist research stance adopted in this dissertation. The adoption of qualitative case study strategy in this research is also justified. The researcher explains the empirical research design that represents the roadmap of this research which has been followed from starting this research until drawing the conclusions. At the end, case study protocol is discussed, based on the research characteristics and requirements.

4.1 Introduction

This chapter presents the way in which the aims, objectives, and research questions of the empirical inquiry will be met. Hence, a discussion of the factors affecting selection of an appropriate research approach and strategy is presented in Section 4.2. Section 4.2 then reviews the positivist and interpretivist epistemological stances. The review results in the justification of interpretivism as the epistemological stance selected for this dissertation. This selection leads the researcher to explain in Section 4.3 why a qualitative research approach is adopted in this research and not quantitative. The researcher then discusses in Section 4.4 the implementation of case study research strategy, and justifies the selection of a multiple-case study strategy in the light of the research characteristics, for the purpose of theory building using qualitative methods. In Section 4.5, the researcher presents an empirical methodology to act as a framework for conducting the research inquiry. That discussion includes three parts: (1) Research design, (2) Case study data collection, and (3) Data analysis. At the end of this chapter, the case study protocol is discussed and described based on the action plan of this research. This section includes: (1) Case study overview, (2) Fieldwork research procedures, (3) Questions addressed in this research, and (4) Research output format.

4.2 Selecting Appropriate Information Systems Research Approach

One of the most important stages in this dissertation is choosing the most appropriate research approach for the empirical inquiry, as there are many information systems (IS) research methodologies and strategies available. According to Kock *et al.* (1997), the growing importance of IS research in the 1980s and 1990s has led to a number of different research approaches and methods, usually adapted from other disciplines such as sociology, natural sciences, and business studies. As a result, different kinds of IS researches have been proposed. Within this range, it is found that studies related to the adoption of IS in the organisation context are beginning to emerge. In addition, IS is a multi-disciplinary field and there is a wide range of philosophical assumptions regarding the underlying nature of phenomena under investigation. Thus, there is no single framework that encompasses all the domains of knowledge needed for the study of IS (Galliers, 1992).

Furthermore, Information system is much more than simply the development of computer-based business systems, ICT is now fundamental within society, so that IS as a discipline must concern itself with the general evolution of human communication (Mingers and Stowell, 1997). Thus, IS encompasses a very wide range of disciplines, such as technology, engineering, natural sciences, psychology, sociology, linguistics, and management. This gives a researcher a pool of research approaches and strategies he/she can choose (e.g. action research, case studies, ethnographic, forecasting, surveys, etc.). Within the empirical approach to IS research, there are two research orientations that should be addressed in order to select the proper research strategy: positivistic (which is an approach essentially derived from the natural sciences) and interpretivist (which is an approach essentially derived from the social sciences).

According to Myers and Avison (2002), all researches selections are based on some underlying characteristics or assumptions about what constitutes 'valid' research and which research methods are appropriate. The characteristics of the research inquiry will greatly influence the selection of an appropriate research strategy (Yin, 2003a). Accordingly, in order to conduct and/or evaluate this research process, it is therefore important to review in this chapter what the research characteristics are.

Although, Chapters 1, 2 and 3 discussed these characteristics, it is useful to summarise them in this chapter to help steer the appropriate research orientation and decide on research strategy. Table 4.1 summarises these research characteristics in the light of which the researcher will be able to justify the selection of a particular research strategy.

Research Dimension	Description
Phenomenon	<ul style="list-style-type: none"> Public sectors over the last few years have decided to adopt e-government to improve their service delivery and business process but still some of these initiatives are in infancy stages.
Research Questions	<ul style="list-style-type: none"> How are government organisations adopt and implement e-government? What are the empirical implementation stages that government organisations follow to implement e-government? What is the significance of implementation sequence towards adoption stages? What are the technical, organisational and environmental factors that influence the adoption process? What are the benefits that promote organisations to adopt e-government? What are the barriers that inhibit organisations to adopt e-government?
Research Aim	<ul style="list-style-type: none"> To develop a frame of reference that will outline the implementation process of e-government that identifies critical stages of action and influential factors which can be used to support the decision process in government organisations.
Theory	<ul style="list-style-type: none"> There is stage of growth model that could help to follow the adoption of e-government process. Technology-Organisation-Environment model There are factors that inhibit adoption of e-government. There are factors that promote adoption of e-government.
Unit of Analysis	<ul style="list-style-type: none"> Public sector organisations' context IT department in government E-government project team practices

Table 4.1: Characteristics of Research

Myers and Avison (2002) emphasise that the most pertinent philosophical assumptions are those that relate to the underlying epistemology which guides the research. Epistemology is the branch of philosophy that addresses the philosophical problems surrounding the theory of knowledge. It answers many questions concerning what knowledge is, how it is obtained, and what makes it knowledge (Fetzer, 1993).

Orlikowski and Baroudi (1991) consider three broad IS research paradigms: positivist, interpretivist, and critical, as described in Table 4.2. They suggest that the positivist was the most widely used in IS articles published between 1983 and 1988. Since then, there has been growing interest in a range of non-positivist or interpretivist approaches due to the increasing realisation of the importance of social issues relating to computer-based information systems, hence the use of interpretivist studies in IS research is gradually gaining weight. Interpretivism was stated by Orlikowski and Baroudi (1991) to be a general research approach, where an in-depth discussion of the epistemology, methodology and ontology assumptions surrounding it

was provided, and a comparison made with those of positivism and the critical theory. According to Irani *et al.* (1999), those who agree with the positivist view believe that knowledge may be learned or communicated, and those who agree with the interpretivist view believe that knowledge can only be gained through observation and personal experience. The two views have an impact on empirical research strategy, as the positivist dictates that the researcher takes the role of an observer, whilst the interpretivist dictates that the researcher gains knowledge by participating in the subject of the empirical study.

It is useful to distinguish among interpretivist and positivist to understand the philosophical approaches that would strengthen the decision taken by the researcher towards the research process. Table 4.2 shows the description of positivist and interpretivist approaches associated with their characteristics that have been analysed from the literature.

Approach	Description	Characteristics	References
Positivist	Assumes reality is objectively given and can be described by measurable properties, independent of researcher and his/her instruments.	<ul style="list-style-type: none"> • Tends to produce quantitative data • Concerns hypothesis testing, formal propositions, quantifiable measures of variables • Seeks to test theory • Drawing inferences about phenomenon from sample to stated population • Knowledge consists of facts that are independent • Data highly specific and precise • Location is artificial 	Denzin and Lincoln (1998) Gaillers(1992) Hussey and Hussey (1997) Lee and Baskerville(2003) Myers (1997) Orlikowski and Baroudi (1991) Remenyi <i>et al.</i> (1998) Walsham (1993) Yin (2003a)
Interpretivist	Seeks to describe, understand and translate phenomena through meanings that people assign to them which produce understanding of context of IS and the process whereby IS influences and is influenced by context.	<ul style="list-style-type: none"> • Understanding deeper structure of phenomenon within cultural and contextual situation • Data rich and subjective that can be gained through social constructions such as consciousness, shared meaning, documents, and language. • What is researched can be affected by process of research • Tends to produce qualitative data • Focus on full complexity of human sense-making as situation emerges • Concerned with generating theories • Location is natural 	Denzin and Lincoln (1998) Gaillers(1992) Hussey and Hussey (1997) Lee and Baskerville(2003) Myers (1997) Orlikowski and Baroudi (1991) Remenyi <i>et al.</i> (1998) Walsham(1993) Yin (2003a)

Table 4.2: Description of Epistemology Stances and their Characteristics

Accordingly, the researcher argues that for the purpose of conducting this research, as discussed in Table 4.1, the interpretivist epistemological stance has been selected on the following grounds:

- As Table 4.2 describes, interpretivism will allow the researcher to study empirically and understand in a more holistic picture the organisation's process towards adoption of e-government through close investigation, observation and face-to-face contact. As well as exploring the factors that promote and inhibit the implementation process of e-government in a natural setting. Further, these stages and factors, as reported in Chapters 2 and 3, are

influenced by many diverse research issues and disciplines such as organisational, managerial, technical, social, and environmental.

- Since the unit of analysis in this research is the public sector organisation (see Table 4.1) which is a complex social structure context that is managed and controlled by different people's sense-making, the e-government adoption process influences and is influenced by them, as described in Chapter 3. Therefore, the interpretivist is the proper approach to understand the adoption process of e-government for the reasons explained thus far.
- The adoption of e-government, and as discussed in previous points, is about dependent issues (e.g. organisational, technical, environmental), and could not be taken as one where facts and values are independent. Thus the positivist approach cannot be used in this research; as stated in Table 4.2, the positivist assumes that knowledge consists of facts that are independent and distinct.
- As mentioned in Table 4.2, the evidence for IS research to be positivist is if there is hypothesis testing, quantifiable measures of variables or formal propositions, and since there are none of these in this research, the positivist approach cannot be used.

4.3 Adoption of Qualitative Research Methods

It becomes clear from the previous section and Table 4.2 that the interpretivist approach is the proper epistemological stance for this research that would appear to require qualitative data. However, before a decision is made towards adoption of qualitative research methods, this section will review these methods, compare them with quantitative methods, and identify the strengths and weaknesses of this kind of information. Thus, the justification for selecting the suitable approach becomes well-defined.

Qualitative research is often confused with the interpretivist approach, and the same goes for quantitative and positivist. However, both interpretivist and positivist are merely philosophical stances or orientations to research and not all qualitative and quantitative researchers necessarily subscribe to them (Remenyi *et al.*, 1998). The terms qualitative and quantitative research methods both refer to a variety of methods of inquiry (Myers and Avison, 2002). The

two methods derive from different scientific tradition. (Maykut and Morehouse, 1994). Quantitative research methods were originally developed in the natural sciences to study natural phenomena. Qualitative research methods, on the other hand, were originally developed in the social sciences to enable researchers to study social and culture phenomena (Myers and Avison, 2002). In addition, Benbasat *et al.* (1987) notice that there is increasing interest in the application of qualitative research methods due to the general shift in IS research away from technological to managerial and organisational issues, and this is mainly the scope of this research. Maykut and Morehouse (1994) suggest a clear portrayal of both research methods. The quantitative method is based on observations that are converted into discrete units that can be compared to other units by using statistics analysis. Qualitative research examines people's words and actions in narrative or descriptive ways more closely, representing the situation as experienced by the researchers.

Since, as shown in Table 4.1, one of the intentions of this research is to focus on the factors that influence action at the decision-making level towards adoption of e-government (e.g. public sector officials, IT managers, IS professionals), so qualitative research methods will more appropriate than quantitative, as the former are designed to help researchers understand people's thoughts and the social and cultural contexts within real life (Maykut and Morehouse, 1994; Myers and Avison, 2002; Strauss and Corbin, 1990).

In order to gain a clearer understanding of qualitative research, it is necessary to compare its basic purpose with that of quantitative research. The following Table 4.3, compares the major characteristics of both that have been analysed by the researcher from the literature (e.g. Benbasat *et al.*, 1987; Denzin and Lincoln, 1998; Galliers, 1992; Hussey and Hussey, 1997; Irani *et al.*, 1999; Lee, 1991; Maykut and Morehouse, 1994; Myers and Avison, 2002; Remenyi *et al.*, 1998; Silverman, 2000).

Characteristics	Quantitative Research	Qualitative Research
Approach	Deductive	Inductive
Purpose	Theory testing, prediction, establishing facts, hypothesis testing	Describing multiple realities, developing deep understanding, theory building, capturing everyday life
Research Focus	Isolates variables, uses large samples, often anonymous to participants, uses tests and formal instruments	Examines full context, interacts with participants, collects data face-to-face from participants, observation
Research Strategy	Structured and closed	Unstructured and open
Research Plan	Developed before study is initiated, structured, formal proposal	Begins with initial idea that evolves as researcher learns more about participants and setting, flexible, tentative proposal
Research Methods	Survey methods, laboratory experiments, formal methods and numerical methods such as mathematical modelling.	Action research, case study research and ethnography. Qualitative data sources include observation and participant observation, interview and questionnaire, documents and texts, and researcher's impression and reactions.
Nature of Data	Hard, rigorous and reliable	Rich, deep and complex
Data Analysis	Mainly statistical, quantitative	Mainly interpretive, descriptive

Table 4.3: Comparison between Qualitative and Quantitative Research

Strauss and Corbin (1990) argue that qualitative research methods can be used to better understand any phenomenon about which little is yet known, as well as to gain new perspectives on issues about which much is already known, or to gain more in-depth information that may be difficult to convey quantitatively. This leads to qualitative research methods being more fitting than quantitative in this case since, as discussed in Chapters 1, 2 and 3, the phenomenon of e-government adoption process is a relatively new research area, and hence there is not much empirical information to explain it (More justifications for choosing qualitative are given at the end of this section). In order to apply the qualitative research methods more productively in this research and aware of the problems that might be raised during empirical enquiry, the researcher analyses, in accordance with the literature review, the strengths and weaknesses of qualitative research methods, as presented in Table 4.4.

Strengths	References	Weaknesses	References
Researcher can study IS phenomena in their natural setting which little is known	Benbasat <i>et al.</i> (1987) Maykut and Morehouse (1994) Silverman (2000)	Sample size smaller than in other types of research which reduces generalisability, controllability and deducibility	Cornford and Smithson (1996) Lee (1991) Maykut and Morehouse (1994) Silverman (2000)
Allows researcher to generate theories from practice	Benbasat <i>et al.</i> (1987) Myers (1997)	Qualitative data predominantly textual with a richness that can be lost when aggregation or summarisation occurs	Lee (1991) Miles and Huberman (1994)
Allows researcher to investigate meanings given by specific audiences, and thus is able to address this issue to some extent.	Silverman (2000)	Interviews with participants can place considerable demands on time, making it difficult to recruit managers and others for whom time is often at a premium	Miles and Huberman (1994)
Allows barriers between researcher and user to be lowered	Benbasat and Stake (1995)	Collected data unstructured and unbounded	Lee (1991)
Allows researcher to have thick and close description of phenomena in context-specific setting	Benbasat and Stake (1995) Myers (1997) Silverman (2000)	Time-consuming in that researcher must spend lengthy amount of time involved with research in terms of data collection process and data analysis	Lee (1991) Miles and Huberman (1994)
Allows researcher to gain in-depth understanding of nature and complexities of processes	Benbasat <i>et al.</i> (1987) Maykut and Morehouse (1994) Silverman (2000)	Data open to a number of interpretations which can reduce accuracy of interpretation results	Cornford and Smithson (1996) Silverman (2000)

Table 4.4: Strengths and Weaknesses of Qualitative Research

Accordingly, the qualitative method is the appropriate one to be used in this research. In addition to the strengths and benefits presented in Table 4.4, the following key points will summarise the reasons for this:

- Since e-government adoption is a little-known phenomenon, the qualitative method will allow the researcher to understand and examine in depth the implementation processes, determine the existing adoption stages, and identify the future strategies for the evolution of e-government to generate a theory for e-government adoption.
- In regard to the characteristics of this research shown in Table 4.1, the researcher attempts to understand the factors that prevent or prompt people in government organisations to adopt e-government. Hence this requires a close connection with the people and working environment within the organisation through detailed interviewing and observation. Thus,

the qualitative research will support the researcher to learn from practice and understand the factors that influence the people.

- As discussed in Chapters 1, 2 and 3, e-government is a relatively new research area with limited literature. Thus, qualitative research will assist the researcher to study e-government adoption in its natural setting, and introduces the complexities of the implementation process. The natural setting is the place where the researcher is most likely to discover, or uncover, what is to be known about the phenomenon of interest (Maykut and Morehouse, 1994).

Finally, as described in Table 4.1 and in previous discussions, the research strategy objective must validate, and then develop the theoretical framework of e-government adoption proposed in Chapter 3 within the confines of the empirical study. Having justified the adoption of qualitative research methods, considered their strengths and weaknesses, and described the characteristics of this research (see Table 4.1); this study will employ a research strategy for the purpose of theory building, with an interpretive epistemological stance, which will collect data through qualitative research methods.

4.4 Adoption of Research Strategy

The purpose of this section is to select an appropriate research strategy that will enable the researcher to undertake this research process by embodying a particular style and employing different research methods. This step is relatively difficult, because there are quite a number of options available such as survey, experiments, simulation, case study, action research, and ethnography, and established researchers often argue for their own research (Galliers, 1992). The research strategy that will be adopted in this research is a case study strategy to investigate the e-government adoption process, since generally, it provides the researcher with the opportunity to investigate the organisation's information systems in depth through a series of interviews, document analysis and observation. (Section 4.4.1 will justify the use of case study in detail) Galliers (1992) portrays the case study as an attempt to describe the relationship which exists in reality, usually within a single organisation or organisational grouping. Irani *et al.* (1999) report that case study strategy is one of establishing valid and

reliable information, or research findings, which add to the accumulation of knowledge about processes within a business unit.

4.4.1 Justifying Use of Case Study

Case study research is the most common qualitative method that is particularly well suited to be used in information systems research, since the object of the discipline is the study of IS in organisations, and interest has shifted to organisational rather than technical issues (Benbasat *et al.*, 1987; Irani *et al.*, 1999; Orlikowski and Baroudi, 1991).

Additionally, case studies emphasise detailed contextual analysis of a limited number of events or conditions and their relationships. Researchers have used the case study research method for many years across a variety of disciplines (Choudrie and Dwivedi, 2004; Myers and Avison, 2002). Social scientists, in particular, have made wide use of this qualitative research method to examine contemporary real-life situations and provide the basis for the application of ideas and extension of methods. Yin (2003a, p.13) defines the case study research method as “*an empirical inquiry that investigates a contemporary phenomenon within its real-life context; especially when the boundaries between phenomenon and context are not clearly evident*”.

In this dissertation, case study can be used as a vehicle for creating a story or narrative description of the adoption process for e-government, in such a way that it represents a research finding in its own right, and thus can be said to have added value to the body of knowledge which is the fundamental of this dissertation. Remenyi *et al.* (1998) describe the case study as providing an explanation of the observed phenomena (i.e. e-government adoption process), and demonstrating understanding of the subject of the investigation in its context and environment (i.e. public sector organisation).

Benbasat *et al.* (1987), Remenyi *et al.* (1998), and Yin (2003a,b), provide four main reasons that have been analysed and extended by the researcher and have led to use of a case study research strategy in this dissertation:

- The researcher can study the e-government phenomenon in a natural setting, learn about the state of the art, and then generate relevant theory from the understanding

gained through observing actual decision-making practices towards e-government implementation.

- Regarding the research questions as illustrated in Table 4.1, the researcher can answer the questions of why, what and how, (e.g. How the organisation implements e-government, What factors inhibit or promote the adoption of e-government) with a relatively full understanding of the nature and complexity of the e-government phenomenon and adoption processes taking place (This point will be explained in detail below).
- Since e-government adoption in the public sector is not well known, the case study research lends itself to early exploratory investigations where the variables are still unknown, for research in a previously little-studied area and where the phenomenon is not at all understood.
- Since one of the objectives of this research (see Table 4.1) is to validate the proposed theory of e-government adoption stages, case studies are more suitable for the exploration, classification and development stages of the knowledge building process, and detection of patterns of practice, which are a research feature needed by this study.

However, there are several challenges in conducting case study research: it is time-consuming, it needs skilled interviewers, and the study of a small number of cases can offer no grounds for establishing reliability or generalisability of findings, and for ensuring rigorous research. Other researchers feel that the intense exposure to study of the case biases the findings (Benbasat *et al.*, 1987; Cavaye, 1996; Lubbe, 2003; Voss *et al.*, 2002). The issue of generalisation has appeared in the literature with regularity. It is a frequent criticism of case study research that the results are not widely applicable in real life. However, Yin (2003a), in particular, has refuted that criticism by presenting analytic generalisation as a vehicle for case study generalisation. He describes it as, “*In analytic generalisation, previously developed theory is used as a template against which to compare the empirical results of the case study*” (Yin, 2003a, p. 32). Therefore, the use of theory before conducting case study becomes the main vehicle for generalising results as done in this research. In addition, the results of case study research can have very high impact, and many researchers continue to use the case study

research method with success in carefully planned and crafted studies of real-life situations, issues, and problems. Unconstrained by the rigid limits of questionnaires and models, it can lead to new and creative insights, development of new theory, and have high validity with practitioners - the ultimate user of research (Eisenhardt, 1989; Irani *et al.*, 1999; Stuart *et al.*, 2002; Yin, 2003a).

Other key strengths of case study come through conducting research in the field and being exposed to real problems, the focus on the practices of an organisation, the creative insights of people at all levels of organisations, and the varied contexts of cases, as well as the individual researcher benefiting personally from the process of conducting the research, as is valid in this research (Cavaye, 1996; Voss *et al.*, 2002).

Many of the breakthrough concepts and theories in Information systems, from systems evaluation to organisational adoption of IT strategy, have been developed through field case research. According to Choudrie and Dwivedi (2004), analysis of research approaches adopted in the IS field of 633 articles published in peer-reviewed IS journals (e.g. *MIS Quarterly*, *Information Systems Research*, *European Journal of Information Systems*, and *Information Systems Journal*) during 1992 to 2003. They have found that researchers involved in technology adoption research used predominantly two research approaches: survey, most widely used in the domain of technology adoption for users, household and online consumers, and case study, employed exclusively to study the organisational adoption of technology, as in this study.

Many researchers in discussing research methodologies (e.g. Benbasat *et al.*, 1987; Galliers, 1992; Myers and Avison, 2002; Yin, 2003a) have divided case studies into three common research concepts: exploratory, descriptive and explanatory. *Exploratory* cases are sometimes considered as a prelude to social research. *Explanatory* case studies may be used for doing causal investigations. *Descriptive* cases require a descriptive theory to be developed before starting the project. They also argue that the way the research question is stated will direct the selection of an appropriate research strategy, and the case study research questions generally seek to 'How?', 'Why?', or 'What?'.

In regard to the present work, the case study can be classified as an exploratory case study type and trying to answer questions that begin, respectively, with How (e.g. How do organisations adopt and implement e-government?; How do external factors influence the

adoption stages?; Why (e.g. Why does an organisation not proceed to (next) further stages of adoption?), and What (What are factors that influence the adoption of e-government?) which is clearly demonstrated in Table 4.1. The reasons for selecting exploratory case study is that this research focuses more on questions of a *what* type, as illustrated in Table 4.1. Additionally, exploratory case study is useful for theory building, as it is valuable in developing and refining concepts for further study, in regard to the existing research phenomena which focus on the adoption process of e-government in public sector organisations. The researcher will therefore explore the adoption stages of e-government and identify the factors that inhibit and/or promote the decision for adoption at a particular stage, and thus validate the conceptual framework that has been developed in Chapter 3. In addition, since e-government is relatively new area with limited research, as stated in Chapters 2 and 3, the use of a qualitative research case study strategy is considered by the researcher as appropriate for studying the phenomena of e-government adoption in public sector organisations, and capable of delivering the required empirical data for this study.

In addition, based on e-government literature review, case study strategy has not been used in the area of e-government in public sector organisations in the context of the Kingdom of Bahrain, in particular, and there has been limited study in other regions in general. This is attributed to the fact that there is still a lack of published scientific research regarding e-government, which this dissertation will help to make good.

Accordingly, alongside the characteristics of this research (see Table 4.1), and all the reasons reported thus far, with the nature of the phenomena discussed above, the researcher reported that the appropriate research strategy for this dissertation is a case study with an interpretive epistemological stance, which collects qualitative data for subsequent analysis and interpretation.

4.4.2 Single vs. Multiple Case Studies

The study of a single case enables the researcher to investigate and get close to phenomena, which allow rich description of primary data, full analysis and identification of structure of phenomena (Irani *et al*, 1999). However, a single case has limitations; it limits the generalisability of the conclusion, models or theory developed from just one case study. Also,

it leads to some risks of the misjudging of a single event, and of exaggerating easily available data (Lee, 1989). On the other hand, although a multiples-case approach may reduce the depth of study when resources are constrained and may not enable the same degree of rich analysis of phenomena as studies of single cases, it helps guard against observer bias and enables differences in context to be related to constants in process and outcomes (Irani *et al.*, 1999; Lee, 1989; Voss *et al.*, 2002). In the light of the characteristics of this research (Table 4.1), a multiple-case study approach would be appropriate for this dissertation, since a single-case study may not provide sufficient data that would justify the final framework of e-government adoption. Using multiple cases enables the researcher to validate and cross-check findings. Also, the analysis of data across organisations is possible with this strategy. Although multiple-case study does not provide the richness of data that a single case study can, this is not however necessary, as the proposed line of research indicates specific data as required by the unit of analysis to validate the conceptual framework. In addition, the analytic conclusion derived from multiple-case study will be more powerful and robust than from a single-case study, as it will be able to move the investigation from one organisational context to another, thus isolating idiosyncrasies that contribute to exploring the phenomenon (Yin, 2003a). Therefore, it will expand the degree of generalisability of findings compared to a single-case study.

4.4.3 Number of Case Studies

The number of case studies conducted depends on how much is known about the phenomenon and how much information can be uncovered for including additional cases (Dyer *et al.*, 1991). Selecting which and how much fieldwork to undertake is a particularly difficult element of case study research. Eisenhardt (1989) suggests that four to ten useable sites are necessary for case research, depending on the number of critical causal variables proposed. However, Stuart *et al.* (2002) suggest having one to three cases is sufficient, as they argue that as far as an upper limit, the guiding principle has more to do with diminishing returns rather than expanding beyond a dozen sites (Eisenhardt, 1989; Stuart *et al.*, 2002).

The research in this dissertation employed multiple case studies within the limits suggested by Stuart *et al.* (2002), which is three case studies. The reason for this is that the proposed

strategic framework of e-government, as shown and discussed in Chapter 3, divided the adoption process into four stages (i.e. government information delivery, one-way service delivery, two-way service delivery, and government integration). It has been assumed by the researcher that the growth level of e-government in case organisations varies, according to their organisational capabilities and ICT requirements, hence each organisation has possibly approached a different stage, as presented in Table 5.3. Therefore, as part of the research questions of this dissertation, it was necessary to identify the factors that influenced the adoption of each stage approached, which implied examining multiple cases. For example, organisation 1 approached stage 1, organisation 2 approached stage 3, etc.

Consequently, the researcher studied three government organisations located in the Kingdom of Bahrain as multiple case studies, the Central Informatics Organisation (CIO), the Ministry of Social Affairs and Labour (MOLSA), and the Ministry of Commerce (MOC), as shown in Table 5.3, since they provided sufficient information for this research, and a fourth would not have contributed further significant data. The selection of these case organisations is based on the number of adoption stages that they have already approached, thus enabling the researcher to collect the necessary data required for each stage. The selection of these organisations is also based on three different contexts namely, level of interaction (e.g. G-to-G, G-to-B, G-to-C), organisational size (e.g. small, medium, large), and maturity stage of e-government implementation (e.g. stage 1, stage 2, stage 3). This had led to confirm the validity of the revised framework in a wide range of government organisations in the Kingdom of Bahrain, and possibly in other similar countries.

4.5 Empirical Research Methodology

The empirical research methodology deals with the professional way of studying the case organisations taking into consideration the case study variants. The general empirical methodology is presented in Figure 4.1, which outlines the way in which the empirical inquiry of this research will proceed in accomplishing its aim, objectives and research questions that have been discussed in Chapter 1, and summarised in Table 4.1. The empirical research methodology is composed of three parts, as follows: Research design, Case study data collection, and Case study data analysis which will be discussed in the following subsections.

4.5.1 Research Design

According to Yin (2003a), research design is a logical sequence, collecting data, analysing, and interpreting observations, that connects the empirical data to a study's initial research questions and, ultimately, to its conclusion.

The research design will give the researcher a detailed plan, which will be used to guide and focus the research process. Also, it will help to avoid situations in which evidence does not bear on the initial research questions. Figure 4.1 illustrates the major stages of research design in this work. The first three stages: Research problem definition, Develop theoretical framework, and Research questions definition, have been explained, respectively, in Chapters 1, 2, and 3. The significant part of research design is the Data theory, which relies on the selection of the research methodology. It represents the intended empirical investigation that passes through three primary stages: Identification of research strategy, Identification of research methods, and Identification of unit of analysis. These stages have been discussed in this chapter. Based on the data required to validate the proposed model, the epistemological stance is determined and justified, which is interpretivist, and the type of research methods is determined, which is qualitative. The selection of unit of analysis has been discussed in Section 5.4; the researcher justified the selection of multiple-case study for the purpose of theory building through the employment of qualitative research methods. The further sections of this chapter will discuss the research methods which need to develop measurement instruments to capture the empirical data.

The research design then will be transformed into a plan of action or protocol. The protocol will develop the qualitative research methods to gather data as required for the unit of analysis. The case study protocol will be discussed in detail in Section 4.7.

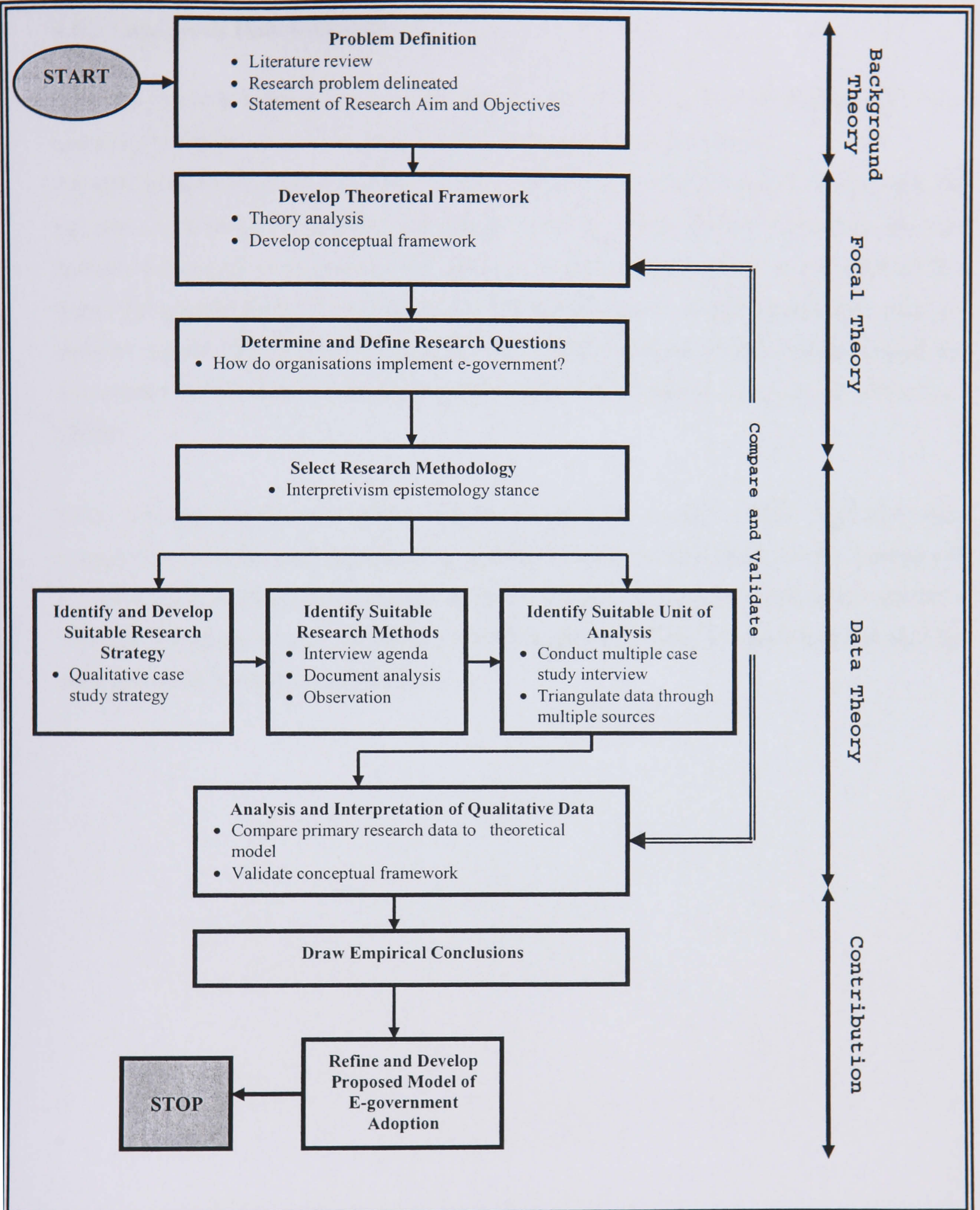


Figure 4.1: Empirical Research Methodology

4.5.2 Case Study Data Collection

Once the research strategy had been decided for this work (i.e. case study research), it was necessary to decide upon the manner in which evidence would be collected.

An underlying principle in collection of data in case study research is that of triangulation, the use and combination of different methods to study the same phenomenon which provides stronger substantiation of theory. Such methods or sources can include, as Yin (2003a) lists them: (1) documentation, (2) interviews, (3) direct observation, (4) participant observation, (5) archival records, and (6) physical artefacts. The multiple methods of data collection make the conclusions and findings of research more reliable and consistent (Voss *et al.*, 2002; Yin, 2003a).

Table 4.5 provides the six major sources of evidence in case studies, considers their comparative strengths and weaknesses as identified by Yin (2003a), and provides examples of the use of these sources in this research in the last column. There is no single source that has a complete advantage over all the others, so the researcher as Table 4.5 illustrates, had used the most accessible methods to collect data.

Sources of Evidence	Strengths	Weaknesses	Suggested Sources for this Study
Documentation	<ul style="list-style-type: none"> ○ Stable-can be reviewed repeatedly ○ Unobtrusive – not created as a result of case study ○ Exact – contains exact names, references and details of events ○ Broad coverage - long span of time, many events and many sittings 	<ul style="list-style-type: none"> ○ Retrievability – can be low ○ Biased selectively, if collection is incomplete ○ Reporting bias - effects (unknown), bias of researcher ○ Access may be deliberately blocked 	<ul style="list-style-type: none"> ○ Annual, quarterly, and monthly progress reports about e-government implementation ○ References material downloaded from organisation website, e.g. organisation structure, strategy, missions etc. ○ Newspaper clippings ○ Brochure ○ Organisation leaflets
Archival Record	<ul style="list-style-type: none"> ○ [Same as above for documentation] ○ Precise and quantitative 	<ul style="list-style-type: none"> ○ [Same as above for documentation] ○ Accessibility for privacy reasons 	<ul style="list-style-type: none"> ○ Organisational records, e.g. charts, layout ○ Service records ○ Project contract with outsource company- if any
Interviews	<ul style="list-style-type: none"> ○ Targeted – focuses directly on case study topic ○ Insightful – provides perceived causal interfaces 	<ul style="list-style-type: none"> ○ Bias due to poorly constructed questions ○ Response bias ○ Inaccuracies due to poor recall ○ Reflexivity – interviewee gives what interviewer wants to hear 	<ul style="list-style-type: none"> ○ Structured interviews ○ Semi-structured interviews ○ Unstructured interviews
Direct Observation	<ul style="list-style-type: none"> ○ Reality – covers events in real time ○ Contextual – covers context of event 	<ul style="list-style-type: none"> ○ Time-consuming ○ Selectivity – unless broad coverage ○ Reflexivity - event may proceed differently because it is being observed ○ Cost – hours needed by human observers 	<ul style="list-style-type: none"> ○ Formal and informal meetings with interviewee for additional data ○ Working environment (e.g. servers room, configuration process, etc.)
Participant Observation	<ul style="list-style-type: none"> ○ [Same as above for direct observation] ○ Insightful into interpersonal behaviour and motives 	<ul style="list-style-type: none"> ○ [Same as above for direct observation] ○ Bias due to investigators' manipulation of events 	<ul style="list-style-type: none"> ○ Simple participant – if possible
Physical Artefacts	<ul style="list-style-type: none"> ○ Insightful into cultural features ○ Insightful into technical operations 	<ul style="list-style-type: none"> ○ Selectivity ○ Availability 	<ul style="list-style-type: none"> ○ Network devices ○ Infrastructure components ○ Hardware and software

Table 4.5: Data Collection Methods: Strengths, Weaknesses and Use in this Research
Source: Yin (2003a)

According to Table 4.5 and the research studies (e.g. Lee, 1991; Maykut and Morehouse, 1994; Silverman, 2000; Voss *et al.*, 2002; Walsham, 1995), interviews and document analysis are the most common and powerful data sources for interpretive case study research.

Therefore, the researcher used qualitative interview as the primary strategy for data collection of this research, in conjunction with document analysis and other accessible secondary sources (e.g. website resources, observation of working environment).

4.5.2.1 Interviews

Interviews were one of the frequently used data collection tools utilised for this research. Interview is central to most qualitative data collection efforts (Lee, 1991); according to Silverman (2000), verbal confirmation or disconfirmation of observation, or any formal, informal or casual answers to a question, constitutes an interview. Hussey and Hussey (1997) describe interviews as a method of collecting data in which selected participants are asked questions in order to find out what they do, think or feel. Interviews make it easy to compare answers and may be face-to-face, voice-to-voice, or screen-to-screen, conducted with individuals or group of individuals (Hussey and Hussey, 1997; Maykut and Morehouse, 1994). The main purpose for conducting interviews in this research was to investigate the understanding of e-government adoption among the government officials, IS/IT managers, and development team. The personal interview encouraged the interviewee to relate experiences and attitudes relevant to the research problem. Personal interview also provided the opportunity for the researcher to probe deeply to uncover new clues, to open new dimensions of a problem, and to secure vivid, accurate, inclusive accounts based on personal experience. The interview was conducted in series with different levels of organisation employees as indicated in Table 4.6, according to the need of information. From time to time, interviews might be altered; as Lofland and Lofland (1984) state, in keeping with the flexible nature of qualitative research design, interview guides can be modified over time to focus attention on areas of particular importance or to exclude questions researchers may find unproductive for the goals of the research. Most of the interviews of this research were open-ended, as presented in the interview agenda in Appendix B, which the researcher used an interview guide or questionnaire to provide some structure to the interview (Remenyi *et al.*, 1998), and was a series of questions relating to the unit of analysis and designed to guide the researcher during the interview.

There are three major forms of interviews, depending on the amount of structure imposed by the researcher, that have been discussed by research studies (e.g. Denzin and Lincoln, 1998; Hussey and Hussey, 1997; Maykut and Morehouse, 1994):

1. **Structured interview:** Questions have been well prepared before the interview takes place and the researcher should ask specific questions that follow the interview agenda.
2. **Semi-structured interview:** The semi-structured interview is one with predetermined questions asked of all respondents in the same manner and a sequence not fully specified in advance, with an open-ended format.
3. **Unstructured interview:** Questions have not been prepared beforehand, which leads to informal conversation initiated and guided by the researcher.

In regard to the context of this research, throughout the investigation of the case organisations, the participants were interviewed by using semi-structured interview technique, since when used within the context of a key informant interview (i.e. repeated across each case study organisation). Face-to-face semi-structured interviews are widely recognised as a powerful tool with which to generate rich data regarding the e-government phenomenon under investigation (Sekaran, 2000). The contents and sequence of questions were not fully specified in advance, since they varied with different respondents. Therefore, it left the researcher open and sensitive to new aspects, issues, and answers offered by the interviewee. In addition, since e-government is a relatively new initiative in the public sector, semi-structured interviews benefited from questions dealing with feeling and attitudes of a certain action, for example the attitude of managers towards electronic application forms (Cryer, 2000; Ghauri *et al.*, 2002; Hussey and Hussey, 1997). Jankowicz (2000) notes that the semi-structured interview is a powerful data collection technique when used within the context of the comparative case study research method since it allows researcher to dictate both the topic and issues to be investigated, whilst minimising or preventing data bias through the careful pre-design of the survey questions.

In addition to semi-structured interview, the researcher used both structured interview and unstructured in some situations. Structured interview was used in interviews with senior managers (e.g. secretary and undersecretary) so that the researcher knew in advance the specific questions which would be asked to control the interview period, and thus the questions were based on the interview agenda prepared by the researcher. The researcher also used unstructured interview to deal with discussions that the researcher had with interviewees during free time (e.g. lunch time, coffee breaks, etc.). Thus, the unstructured interview allowed

the researcher freedom to move the conversation in any direction of interest that might arise. Especially when the researcher desired to clarify some issues derived from semi-structured or structured interview and fill some gaps identified after semi-structured interview. Consequently, unstructured interviewing was particularly useful for exploring a topic broadly. Through the interviews with senior managers in the case organisations, the researcher found that directors and managers were reluctant to reveal problems or negative aspects about their projects. It was felt that this could create an unfavourable impression, and hence they repeatedly discussed the good aspects. Therefore, the researcher changed the interviewee level from executive management to middle and lower management, since these employees were more likely to be directly involved and affected by the implementation process in the organisation and to be willing to disclose problems. The entire interviews were tape recorded and later transcribed and translated from Arabic to English, so that a full record of the conversation was obtained. Recordings have the advantage of capturing data more faithfully than hurriedly written notes might, and can make it easier for the researcher to reflect on the interview. It provides a more accurate rendition of any interview than any other method (Yin, 2003a).

The interview of this research focused on three main areas, as indicated in the interview agenda (see Appendix B), IT/IS development in organisation, organisation business process, and practice of e-government implementation; each area and its associated questions has been explained and justified, as presented in Appendix C.

4.5.2.2 Documentation Analysis

Documents play an explicit role in any data collection in doing case studies, thus systematic searches for relevant document are important in any data collection plan (Yin, 2003a). The most important use of documents in this research is to corroborate and augment evidence from other resources. First, documents are helpful in verifying the correct spelling and titles or names of organisation, as well as the structure of the organisation, that have been mentioned in the interview. Second, documents can provide other specific details to corroborate information from other sources (Yin, 2003b; Jankowicz, 2000; Sekaran, 2000). Thus, the researcher focus on some working papers and documents that facilitated the collection of technical information and provided information regarding the background of the case organisation. Such data include among others, organisational structure, nature of services provided by the

organisation, information systems infrastructure, missions, e-government strategic plan, and legislation statement (see Table 4.5). In addition, the researcher attempted to collect a progress report that addressed the adoption and implementation of e-government which was prepared by the IS development department. These documents verified the data from other sources, and limited the interview time with participants by raising significant points obtained from documents.

4.5.3 Data analysis

Data analysis is the third and final part of the empirical research methodology, as presented in Figure 4.1. Empirical data derived from the case studies were triangulated (see Table 4.6) and then were analysed to draw empirical conclusions. Since the type of data that collected in this research is qualitative in nature, the analysis methods are often not well formulated (Lubbe, 2003). The process of qualitative data analysis may take many forms, but is fundamentally non-mathematical in nature. According to Bogdan and Biklen(2003), qualitative data analysis is working with data, organising them, breaking them into manageable units, synthesising them, searching for patterns, discovering what is important and what is to be learned, and deciding findings. While the interview is the main data collection method in this research, so the data analysis involved examining the meaning of people's words and actions. Each sentence provided by the interviewees was coded and cross-referenced to the factors in the proposed conceptual framework to enable both content analysis and analysis of all the factors across organisations and interviewees. Interviews were tape-recorded, transcribed in Arabic, and then translated into English prior to analysis. On average, 50 pages of transcripts for the CIO case organisation as a major one, 35 pages for the MOLSA case study, and 40 pages for the MOC case study were obtained from interviews. These were subjected to detailed content analysis, based on the precoded question structure, to establish, for each case, a comprehensive understanding of the relevance of each factor, as illustrated in the interview agenda description presented in Appendix C. The data were summarised using several tables classified by organisation, by factor, and by implementation stage of e-government. The researcher used one of the latest software packages for qualitative data analysis in the three case organisations, called *Atlas.TI* version 5.0. As much of the literature emphasised (e.g. Kelle, 1995), computer-aided methods can enhance the validity of research findings from qualitative studies in two ways: first, they can assist the management of a large amount of data

and samples, and second, given that a reliable and stable code is applied, they offer facilities to retrieve all relevant information about a certain topic. This increases the trustworthiness of qualitative findings considerably, because these facilities can ensure that the research questions are really grounded in the data and not based on single and highly untypical incidents.

4.6 Data Triangulation in this Research

Case study is known as a triangulated research strategy. According to Patton (1987) and Flick (2002), triangulation is a tool by which data can be validated, and triangulation can occur with data, investigators, theories, and even methodologies. Stake (1995) states that the protocols that are used to ensure accuracy and alternative explanations are called triangulation. The need for triangulation arises from the ethical need to confirm the validity of the processes and to overcome the potential bias and sterility of a single-method approach (Eisenhardt, 1989; Hussey and Hussey, 1997; Remenyi *et al.*, 1998; Stuart *et al.*, 2002; Yin, 2003b). In the context of case studies research, this could be done by using multiple sources of data (Yin, 2003a), as shown in Table 4.6. Denzin and Lincoln (2003) identified four types of triangulation: Data source triangulation, when the researcher looks for the data to remain the same in different contexts; Investigator triangulation, when several investigators examine the same phenomenon; Theory triangulation, when investigators with different viewpoints interpret the same results; and Methodological triangulation, when one approach is followed by another, to increase confidence in the interpretation.

As discussed in the previous sections and as Table 4.6 illustrates, the researcher applied multiple data sources as data and methodological triangulation within each case study to preserve the reliability and validity of findings. As Yin (2003a) states, the greatest advantage of use of multiple sources of evidence in case studies is the development of converging lines of inquiry, and thus any finding or conclusion in a case study will be more convincing and accurate. In addition, the researcher employed in this research as well multiple methods to study a single problem as methodological triangulation, and also conduct multiple levels of interviewees, which the same empirical data can be collected from senior managers, and then approve it by interviewing someone from mid- or low-level management. Table 4.6 shows the

implementation of triangulation in this research in terms of data, interviewee level and methodological.

Case Organisation	Triangulation type	Sources		
Central Informatics Organisation (CIO)	Data	<ul style="list-style-type: none"> • CIO projects reports and GDN progress plan • Newspaper clippings • E-mails • Observations • Face-to-face Interviews • Website materials • CIO Leaflets 		
	Methodological	<ul style="list-style-type: none"> • Documentation analysis • Archival records for CIO projects • Interviews • CIO website evaluation • Observations 		
	Interviewee Level	High-level Management	<ul style="list-style-type: none"> • Undersecretary • General manager 	
		Med-level Management	<ul style="list-style-type: none"> • Technical services director • Computer applications director • E-government projects manager • BPR manager 	
		Low-level Management	<ul style="list-style-type: none"> • GDN administrator • LAN manager • E-government projects members • Smartcard project developers 	
	Ministry of Commerce (MOC)	Data	<ul style="list-style-type: none"> • E-government projects progress reports • MOC strategic plan • Newspaper clippings • Observations • Face-to-face Interviews • Website resources • Organisation Leaflets 	
Methodological		<ul style="list-style-type: none"> • Documentation analysis • Interviews • Observations • MOC portal evaluation 		
Interviewee Level		High-level Management	<ul style="list-style-type: none"> • Minister • Undersecretary Assistant 	
		Med-level Management	<ul style="list-style-type: none"> • E-commerce manager • IT manager • E-government projects managers 	
		Low-level Management	<ul style="list-style-type: none"> • Website administrator • Network manager 	
Ministry of Labour and Social Affairs (MOLSA)		Data	<ul style="list-style-type: none"> • Progress reports • Observations • E-mails • Face-to-face interviews • Website materials 	
	Methodological	<ul style="list-style-type: none"> • Documentation analysis • Interviews • Observations • MOLSA website evaluation 		
	Interviewee Level	Med-level Management	<ul style="list-style-type: none"> • Technical services director • IT manager 	
Low-level Management		<ul style="list-style-type: none"> • Web applications developer • LAN manager • E-government projects members 		

Table 4.6: Types of Triangulation Used in this Research

4.7 Case Study Protocol: Research Objectives and Schedules

A case study protocol is a tool that would organise the research, acting as an action plan, and setting rules and regulations by which data would be gathered. Having a protocol is considered essential, as a major way of increasing the reliability of case study research, and is intended to guide the investigator in carrying out the data collection from single or multiple case studies (Lubbe, 2003; Yin, 2003a).

A protocol contains, but is more than, the research instruments. It also contains the procedures and the general rules that should be used in using the instruments, and indicates who or from where different sets of information are to be sought (Voss *et al.*, 2002). The documentation of case study procedures will allow other investigators to repeat the same case study to reach the same findings and conclusions, hence, preserve the reliability of the case study (Remenyi *et al.*, 1998). The core of the protocol is the set of questions to be used in interviews. It outlines the subject to be covered during an interview, states the questions to be asked, and indicates the specific data required (Lubbe, 2003; Voss *et al.*, 2002; Yin, 2003a).

There are many researchers who emphasised the importance of the case study protocol, particularly in multiple-case study, including, Hussey and Hussey (1997), Irani *et al.* (1999), Lubbe (2003), Remenyi *et al.*, (1998), and Yin (2003a). In this dissertation, the researcher followed the protocol outline suggested by Yin (2003a), namely: (1) case study overview, (2) fieldwork research procedures, (3) questions addressed by the research, and (4) research output format. This outline helped the researcher to map the major tasks and procedures that would take place during the case studies in this research, and thus guide the researcher in mapping the data collection in an efficient and reliable way.

4.7.1 Case Study Overview

The case study overview covers the background information about the research topic (i.e. e-government adoption) and the substantive issues being investigated to assist the researcher in focusing on the objectives and the main questions that need to be studied. As well, it helps anyone who may want to know about the research (Remenyi *et al.*, 1998). The overview will preserve the communication between the researcher of this research and the case study objectives which leads the researcher to collect only the required data to study the adoption of

e-government in the public sector, though maintaining focus during the interviews. There are five key issues on which the researcher needs to concentrate:

- To identify the adoption process of e-government that takes place in the case study organisations.
- To identify the empirical sequence of adoption stages during the implementation of e-government.
- To identify those technical, organisational, and environmental factors which influence the adoption of e-government, and identify their validity with the conceptual framework for e-government adoption (see Chapter 3).
- To identify those factors which promote the adoption and implementation of e-government (benefits).
- To identify those factors which inhibit the adoption and implementation process of e-government (barriers).

4.7.2 Fieldwork Research Procedures

As discussed in Section 4.4.1, throughout the case study in this research, the researcher has to work in the real world and thus cope with real world situations during the data collection plan, including the possibility of a respondent dropping out of the interview, corporate documents may not always be available, or political reasons may prevent some necessary data being collected or revealed (Remenyi *et al.*, 1998; Yin, 2003b). This contrasting process of doing data collection leads the researcher to have explicit and well-planned fieldwork procedures, encompassing guidelines for coping with some unexpected events and behaviour. The fieldwork procedures of the case study protocol need to emphasise major procedures that will be employed during the multiple-case study of this research:

- Defining who should be interviewed: Since the investigations of e-government adoption in this research related to information technology and organisational management capabilities, the interviewees should not be out of this scope. However, the researcher attempted to provide a commitment from the organisation through contacting someone senior enough to be able to open doors with other interviewees

where necessary, as featured in the case of the Ministry of Commerce. In order to verify the data validation of the research, at least three members were interviewed in each case with the same questions. The researcher considered interviewees presented in Table 4.6, as the best informed about the data researched and their role during the adoption process of e-government:

- Identify appropriate data gathering research methods: The personal interview was core method for data collection in this research, as discussed in Section 4.5.2.1. Therefore, the researcher developed an interview agenda that could be used to collect the primary data from the interviewees during both types of interview, structured and semi-structured (see Appendix B). The agenda is used to keep the researcher within the scope of the research topic during the interview process. The data collected from the interview were tape recorded and transcribed at a later time. As presented in Table 4.6, additional data could be gathered from different methods, such as documents, e-government projects progress reports, organisational website of the organisation, organisation strategic plan, and observation. This achieved what the literature calls data triangulation (see Section 4.6).
- Having adequate resources while in fieldwork: Some resources should be well-prepared prior to the data collection in case study; for example, writing material such as stationery and note paper that can be used to write down the necessary comments, notes and clarifications about certain observations. In order to record accurate data during an interview, a good performance tape recorder is required with sufficient cassettes. Agreement to the presence of tape recorder was requested from each interviewee. In addition, the researcher set out a confidential agreement letter to ensure full disclosure of information and to prepare for comfortable conversation with the interviewee.
- Develop an interview schedule: This procedure is about making a clear schedule of the data collection activities that are expected to be completed within specified periods of time. Usually, the interview time in this research could take at least one hour. The researcher set the interview time some days before meeting and confirmed the time with the interviewee within the same day to avoid appointment failure. In the case of

appointment failure by the interviewee, the researcher arranged in advance stand-by employees.

Alongside the procedures discussed above, it is important to emphasise that the interview was a critical channel to collect the required data in this dissertation, so the interviewer needed the skill of being able to distinguish between what was relevant and what was added by the interviewee. It also required the ability to make interviewees discuss issues that may be controversial and confidential. Therefore, the first step was to gain the confidence of the interviewee by establishing the existence of the confidentiality agreement, by which all information disclosed would be presented without indication of the identity of the provider. Then, the researcher asked the interviewee to start by describing his/her function in the organisation. This would lead the interviewee to be at ease, confident and motivated, and in the mood of the interview.

4.7.3 Questions Addressed by Research

At the centre of the protocol is a set of questions reflecting the inquiry of the research (Remenyi *et al.*, 1998). There are some characteristics that distinguish such a set of questions. First, the protocol questions are set for the researcher and not the respondent, to maintain some form of direction to the interview. The questions are reminders or prompts to the researcher concerning the main issues that need to be addressed and answered during each individual case study. Second, each question is accompanied by a list of sources of evidence that cover observations and interviewees' comments. The questions are developed by the researcher to collect relevant data for e-government adoption processes and identify influential factors that will enable or disable implementation for each single adoption stage. The question agenda contains all possible questions that were to be put to interviewees during the case study, as indicated in Appendix B. Generally, the main purposes of the protocol questions were to keep the researcher focus during the data collection process (Lubbe, 2003; Remenyi *et al.*, 1998; Yin, 2003a). Table 4.7 summarises the key questions that were developed by the researcher to guide him in the research direction that the interview should cover (see interview agenda for more details in Appendices B and C).

Question Number	Research Questions
1.	What are the empirical implementation stages that case organisation follow to adopt e-government?
2.	What is the significance of the sequence of implementation stages?
3.	What are the technical, organisational and environmental factors that influence the adoption process?
4.	What are the benefits that promote the case organisation to adopt e-government?
5.	What are the barriers that inhibit the case organisation to adopt e-government?

Table 4.7: Questions Addressed by Empirical Inquiry

4.7.4 Research Output Format

An outline of the case study output format is one of the important parts within the case study protocol (Lubbe, 2003). The guide to compiling the case study format forces the researcher to think about the audience for which the case study is intended early in the process (Yin, 2003a). The researcher was concerned throughout the study with the design of Chapter 5 that presents the empirical data analysis of case studies and reports the output of the empirical inquiry. Case studies often produced large amounts of data and documentation, and this may be used to produce an annotated bibliography. Therefore, the researcher categorised each key question with the interview agenda to improve the quality of presenting the research output format. The presentation of the case studies' findings in Chapter 5 includes primary headings that established the focal points of the required empirical data, namely (1) organisational context, (2) IT infrastructure, (3) organisational behaviour towards e-government adoption, (4) e-government implementation process, (5) e-government benefits, and (6) e-government barriers.

4.8 Conclusions

The aim of this chapter is to propose a rationale for the use of an appropriate research methodology for this dissertation. Since the research in IS has developed relatively recently, attention is given to the methods employed to justify the claim that something has been added to the body of knowledge. Therefore, the research in IS undertaken for this dissertation requires that the methodology used be clearly spelt out in a chapter, so the results of the research are convincing and credible.

Since the aim of this research, as described in Chapter 1 and summarised in Table 4.1, is to develop a theoretical framework for e-government adoption that is proposed in Chapter 3 within the confines of the empirical study. Hence, this dissertation has employed a research strategy for the purpose of theory building, with an interpretive epistemological stance, which will collect data through qualitative research methods. The researcher has justified the adoption of qualitative research methods. As explained in Section 4.3, qualitative research is a proper method to investigate little-known phenomena like e-government, examine in depth the adoption process of e-government through connection of people, and examine the phenomenon in its natural setting. In order to apply the qualitative research methods productively in this research, the researcher discussed the strengths and weaknesses of qualitative research in Table 4.4.

In Section 4.4, the researcher discussed and justified the research strategy that has been used in this research. The strategy was a case study to investigate e-government adoption process, since generally, it provides the researcher with the opportunity to investigate the organisation's information systems in depth through a series of interviews, document analysis and observation. Furthermore, multiple case studies are used within this research to explore and understand the adoption process of e-government. The researcher studies three government organisations located in the Kingdom of Bahrain as multiple case studies, the Central Informatics Organisation (CIO), the Ministry of Social Affairs and Labour (MOLSA), and the Ministry of Commerce (MOC), since they provided sufficient information for this research, and a fourth would not have contributed further significant data. The selection of these organisations is based on three different contexts namely, level of interaction (e.g. G-to-G, G-to-B, G-to-C), organisational size (e.g. small, medium, large), and maturity stage of e-government implementation (e.g. stage 1, stage 2, stage 3). Using three different case studies provides more powerful and robust conclusions in this research through confirm the validity of the revised framework in a wide range of government organisations in the Kingdom of Bahrain.

In addition, the use of research methods was outlined and discussed, and arguments for the suitability of particular methods were provided. Thus, various methods of data collection are used by the researcher during this research, including among others: (1) interview, (2) documentation, (3) observation, (4) archival records, and (5) physical artefacts.

Then, the researcher described the empirical research methodology that maps the way in which the empirical inquiry of this research goes to accomplishing its aim, objectives and research questions, and it has been illustrated through Figure 4.1. In Section 4.7, the researcher presented the case study protocol for this research. This protocol can be used as an important tool that acts as an action plan for the empirical inquiry. According to this protocol, the researcher used case study perspectives to allow others to relate their experience to the outcome of this research. Thus, the work presented in this dissertation will provide a broader understanding of the phenomena of the e-government adoption process.

Chapter 5**Case Studies' Analysis and Preliminary
Research Findings**

This chapter describes and analyses empirical data that are used to validate and test the proposed theoretical framework for the adoption of e-government. The chapter offers an empirical analysis of different case studies' perspectives that describes three major aspects of this research: IT infrastructure, organisational behaviour towards the adoption of the implementation process and, benefits and barriers in the adoption of e-government. Due to the dissimilar culture and context of each case organisation, the researcher proposes to examine each case study separately, describing respective approaches and ICT projects that play a active role in the adoption of e-government. The outcomes of these case study analyses suggested modifications for the proposed conceptual framework, such as incorporating new factors that influence the implementation process of e-government, and restructuring the proposed stage of growth model.

5.1 Introduction

As discussed in Chapters 2 and 3, e-government is a relatively new research area, there is a void of theoretical and empirical frameworks that focus on the adoption process. This has led the researcher to analyse empirically three government case studies to investigate the adoption process of e-government, respective approaches and relevant influential factors to propose a novel framework for e-government adoption and identify factors that influence the implementation.

The chapter begins with a discussion of the emergence of e-government in the Kingdom of Bahrain and respective projects undertaken by the government as part of the e-government strategy. Then an evaluation of the progress of e-government projects within different government organisations is provided through the analysis of their portal contents and services. This will measure the maturity level of e-government evolution across different government organisations based on the stage of the growth model proposed by the researcher in Chapter 3..

The chapter then moves to a detailed presentation of the three government case studies in the Kingdom of Bahrain: the Central Informatics Organisation (CIO), the Ministry of Social Affairs and Labour (MOLSA), and the Ministry of Commerce (MOC). The selection of these organisations was based on three different contexts namely, level of interaction (e.g. G-to-G, G-to-B, G-to-C), organisational size (e.g. small, medium, large), and maturity stage of e-government implementation (e.g. stage 1, stage 2, stage 3). This had confirmed the validity of the revised framework in a wide range of government organisations in the Kingdom of Bahrain. Data collected will relate to their IT projects and implementation process for e-government, and includes an investigation of six key factors; namely, (1) organisational context, (2) IT infrastructure, (3) organisational behaviour toward e-government adoption, (4) e-government implementation process, (5) e-government benefits, and (6) e-government barriers. Additional aspects will also be discussed, since some case studies provided data relevant to the research objectives.

The researcher selected only three case organisations since they provided sufficient information for this research, and a fourth would not have contributed further significant data.

5.2 Overview of Emergence of E-government in the Kingdom of Bahrain

Although the Kingdom of Bahrain is considered relatively small in terms of population, about 700,000, and an estimated 716 sq. km space, it has achieved a high level of social, economic and technological infrastructure in a short period of time. Road and telecommunication networks, public services, education and banking systems, medical services and government data networks are recognised as being among the best in the world. The United Nations has publicly recognised Bahrain's progress by ranking it first among Arab Countries. Bahrain has emerged as the freest economy in the Arab world, ranked the fifteenth most liberalised economy at a global level, according to the 2003 Index of Economic Freedom, published by the *Wall Street Journal* and the Heritage Foundation in Washington.

Recent political reforms in the Kingdom of Bahrain under the leadership of His Majesty, Shaikh Hamad bin Isa Al-Khalifa, the King of Bahrain, have played a critical role in transparency of information flow, improved efficiency in the utilisation of funds, and the availability of government data to the public.

In November 2000, Shaikh Hamad established a committee to create a blueprint to transform Bahrain from a hereditary emirate to a constitutional monarchy within 2 years. The resulting National Action Charter was presented to the Bahraini public in a referendum in February 2001. In the first public vote in Bahrain since the 1970s, the charter was overwhelmingly endorsed by 94.8% of voters.

On February 14th 2002, one year after the referendum endorsing his National Action Charter, Shaikh Hamad pronounced Bahrain a monarchy, and changed his constitutional status from Amir to King. He simultaneously announced that the first municipal elections since 1957 would be held in May 2002, and that a bicameral parliament, with a representative lower house, would be reconstituted, with parliamentary elections in October 2002. As part of these constitutional reforms, the government also created an independent financial watchdog, empowered to investigate cases of embezzlement and violations of state expenditure, in July 2002.

As a result of these political developments, the government of Bahrain has concentrated on enhancing strategic services provided directly to the citizenry through the creation of educational and health care programmes, a housing plan, an e-commerce project, and the

establishment of the National Committee for Information Technologies Development. It has also made ambitious commitment to the provision of services and information by electronic means, as indicated in the Prime Ministers speech to the first session of parliament in October 2002:

'.. Another dimension which will receive considerable attention will be devoted to improving government performance with a high degree of transparency in all information that is related to government activities which will be easily accessible'.

The government of Bahrain is focusing a national effort on leading the region in information technology. Bahrain's e-government strategy undertakes to implement a series of related projects and programmes to improve the effectiveness of information systems and technology within public sector organisations. The strategy provides a framework for planning and actions across the whole public sector, covering local government and executive agencies, non-departmental bodies, and state-wide government departments. The overall e-government programme consists of an infrastructure phase and an application phase, each expected to last two years, which will focus on six major projects that can be implemented in parallel: the Government Data Network (GDN), National Data Services (NDS), National Smart Card, Security Strategy implementation, Technology Platforms, and Government Business Systems. Each of these projects will be explained in Section 5.5.2.

A recent Bahrain government paper issued by the Central Informatics Organisation (CIO) in 2004 stated:

'The kingdom foresees that it must try and guarantee that all residents in the country can benefit from the new technology and the new economy that it will bring. It needs to develop essential laws and policies to bridge the digital divide. Therefore, it has set a target that by 2005, all Bahraini citizens will be able to access the Internet, and then will be given a free government home page and a free E-mail account either in their own homes or through community access points'.

Whether this ambitious programme can be achieved by 2005 or not, the government is undertaking to establish information and communication technologies in the national education curriculum, and in partnership with the private education sector, to invest heavily in educational institutions to equip public schools with computer systems laboratories.

The kingdom possesses most major elements conducive to an e-government. These include a healthy economy, a strong currency pegged to the US dollar, an advanced telecommunications infrastructure, and a government that is undertaking far-reaching political reforms. It also has a young population, a skilled workforce, a relatively high Internet penetration, and a leadership that is strong on the adoption of information and communication technology (ICT). In his speech regarding new political development in Bahrain, the Prime Minister, Shaikh Khalifa Al-Khalifa, emphasised the adoption of the e-government initiative in November 2002:

'In this regard it is worth mentioning that preparations are under way for the completion of what is known as the Electronic Government, whereby all transactions with government can be made through modern communication channels. The Kingdom of Bahrain's advanced telecommunications infrastructure facilitates this objective'.

According to a member of the e-government project committee in the CIO, the telecommunications infrastructure in Bahrain is comparable in certain features to global standards which facilitate the implementation of e-government projects throughout the country; such features include the following:

- A total digital network, including digital switches and inter-exchange fibre optical links.
- Digital international circuits to all business and financial centres in the world.
- A purpose-built environment (Facility Management Centres) for the installation and 24-hour management of customers' telecommunications equipment.
- Advanced communications services for home and business purposes, including ISDN, Broadband, ATM, Frame Relay, MPLS, LANConnect, and VSAT.

- Immediate provision of GSM mobile and Internet services with roaming to over 120 countries.
- Mobile fax and data service through GSM networks.

However, Bahrain has a single telecommunications company named BATELCO, and it has a monopoly over virtually all telecommunications, data transmission and Internet services in the country. Although the current level of telecommunication services in Bahrain is adequate for the current needs of the country due to a relatively small land area, limited population, and the quality of services provided by BATELCO being relatively high, major improvements must be introduced if Bahrain is to become an information society. These can be done by bridging the digital divide, such as increasing the bandwidth of the Internet, reducing the cost for some services, such as DSL and wireless communications, and increasing penetration of the Internet. These improvements can be achieved by opening the telecommunications market to other companies in order to increase competition. Indeed, plans are under way to open up the telecommunications market in Bahrain to competition. The government has recently set up a new autonomous body called the Telecommunication Authority to regulate the telecom sector. In April 2003, a licence was granted to another provider of mobile services (Vodafone), and the company started its services in September 2003. There is a plan for the Telecommunication Authority to submit tenders for land telecommunications and Internet services in the next 2 years. This will allow specialised international telecommunications and IT companies to capitalise on a well-established infrastructure, which intends to continue the development of information and communication technology infrastructure in Bahrain, and hence speed up the provision of e-government culture among the citizenry.

The Kingdom of Bahrain thus has many ingredients already in place for building an e-government society in the near future, as stated by the undersecretary assistant of the CIO. The Government Data Network (GDN) and the Central Population Register (CPR) are the primary components that will represent e-government infrastructure building and help to support the electronic gateway for citizen services. GDN connects various government Ministries and directorates, and enables any government department to be connected to the GDN architecture which supports access applications and data to Ministries (see Figure 5.2). CPR systems, which include unique identifiers for people, land, and establishments, are located in a central

database that could be shared by all government Ministries and establishments through the GDN.

One major drawback, however, has been identified through the study of Bahrain e-government strategy, which is that there is no single executive body to coordinate, manage and control the movements towards e-government among government organisations. It has been noted that each individual Ministry or directorate has its own implementation framework for e-government, which might cause conflict between various applications and systems when they approach the integrated single e-government portal stage. Without central oversight and coordination, government organisations will make what they deem to be ICT purchases appropriate for their purposes, or will develop their own in-house systems (this point will be elaborated in further sections).

Currently, there are three governmental bodies involved in the overall e-government project planning, which were originally part of the e-commerce panel created by the government. These are Cabinet Ministers and headed by the Crown Prince, the Economic Development Board (EDB), and the Central Informatics Organisation (CIO). However, no coordinated efforts exist that can be regarded as forming a single country-wide strategic framework for e-government. Moreover, the e-commerce panel is responsible for creating the necessary legislation and policies to allow e-commerce to flourish, and for devising strategies to attract prominent players into the e-commerce field.

The CIO is responsible for the overall IT strategy and infrastructure implementation for all governmental bodies. The CIO also hosts the e-government web portal (www.bahrain.gov.bh) which is targeted to be an integrated one-stop portal for administrative information and services. It is expected to become the official gateway of e-government services in Bahrain. However, this website provides only static information, news, and some links to other Ministries. There is no regular updating of its contents by the CIO (more details in Section 5.5.5). The EDB was established in April 2000 as an autonomous semi-private agency to lure foreign investments in six key economic clusters, including IT and telecommunications. The EDB is charged with formulating and overseeing the economic development strategy in Bahrain. With assistance from other government bodies, such as CIO and the Ministry of Commerce, the EDB has drafted an e-commerce law to govern online transactions.

From a legislative perspective, a final draft of the e-commerce law, which lays down the legal foundation for electronic transactions, was approved by the government in 2002. The law follows the advanced law guidelines from North America, the European Union, Hong Kong and Singapore, with such laws being adapted to suite the Bahraini environment. It recognises digital signature and other means of electronic verification, and identity of authentication. It also establishes the framework for conducting e-business and other forms of contracting and transacting over the Internet, while preserving contractual rights and obligations. The government of Bahrain claims that this law will help speed up the process of e-government. However, this law is able to address only 45% of the e-government environment, and is unable to address many other issues related to e-government, such as Government-to-Government transactions and citizens' rights to interact with the government portal electronically. Moreover, this law needs to be updated periodically in order to ensure it meets legislative global standards. These shortcomings point to the absence of an explicit government policy agenda for e-government (see Section 5.7.5 for more details).

The transformation to e-government in Bahrain is supported by an e-government strategy drafted by the CIO; it maps out a blueprint for the transformation process, and provides direction to all communities of the public authorities (e.g. Ministerial, Regional, and Municipal). The proposed e-government strategy clarifies the framework for the basis of e-government in Bahrain and emphasises implementation of a series of related projects or programmes (e.g. National Data Services (NDS), National Smart Card, Security Strategy implementation, Technology Platforms, and Government Business Systems) to improve the effectiveness of systems and technology within the government of Bahrain. The strategy is conventional IT strategy which proposes technical solutions to a defined set of business and information needs. The business processes of government are too varied and complex, and the range of its dealings and contacts too great, for this to be easily and quickly achieved. However, the researcher feels that the proposed strategy is curtailed by the lack of coordination between the CIO on the one hand and other IT departments across government on the other. The proposed strategy has not been circulated and discussed with other IT departments in government in order to define their IT and organisational requirements, or to introduce expected problems or barriers that might be encountered during the implementation of the strategy. The authors of the strategy also did not take into account stakeholders' views

when outlining the e-government framework strategy. Moreover, the strategy has not yet been adopted by the Cabinet Office, so the commitment from government to adopt and apply the proposed framework through government organisations is not firmly established.

While the e-government strategy provides a framework for planning and action across the whole public sector, covering local government and the executive agencies, non-departmental bodies and state-wide government departments, in Bahrain, the main concern of this strategy is the development of IT infrastructure within government to build the communications and applications infrastructure in order to promote the internal efficiency of administrative activities. However, there is no indication as to the implementation framework and project plan that should be undertaken by public sector organisations' in order to transform their traditional services and transactions into electronic format, and then deliver the services to their website. Further, the strategy also does not determine IT and management requirements for integrating all public organisations' websites into a single government portal.

Therefore, the e-government strategic programme is exclusively made up of IT components, each being the focus of a project. The estimated cost of e-government projects (see Section 5.5.2) in Bahrain through separate IT projects undertaken by various governmental departments is between US\$150 and \$200 million. The programme strategy includes the following active component projects:

- Implementation of the Architecture Adherence Policy
- Implementation of the Central Technical platforms
- Implementation of the required Network topologies, protocols and bandwidth
- Establishing the Contents of the National Data Set
- Transforming selected applications into Internet-based applications
- Development and implementation of a new Disaster Recovery Plan (DRP) project
- Implementation of the remainder of the security strategy
- Government portal project
- Public key infrastructure (PKI) project
- National call centre project
- National smart card project
- National service centre project

(These projects will be discussed in detail in Section 5.5.2.)

Bahrain held the first online Arab national referendum when the CIO devised a project to automate the referendum based on advanced computer technology and put it to the test in February 2001. The e-referendum was successful in terms of accuracy and time-saving, and hence attracted 200,000 voters. This was partly due to the assignment of a unique CPR number to every Bahraini and resident in Bahrain. The CPR number was incorporated into a card with encrypted computerised information about the user in the form of a two-dimensional barcode. The CPR card, which was inspired by a Scandinavian model, allows its holder to swipe it at a polling centre equipped with advanced computer networks and barcode reader tools during National Action Charter voting, Municipal elections and Parliamentary elections, and provides instant identity verification, validates the voting centre, and ensure that no one can vote more than once. The card now facilitates all kinds of interactions between the electronic government services and the citizens.

The Kingdom of Bahrain was featured in a high profile e-government report published in May 2002, called *Benchmarking e-Government: A Global Perspective*, to assess e-government progress of the United Nations' 190 members. The UN Division for Public Economics and Public Administration (UNDPEPA) and the American Society for Public Administration (ASPA) placed Bahrain high in the four categories of e-government development. An e-government index devised for the report gave Bahrain a rating of 2.04 compared to a global mean of 1.62, the highest score of 3.11 being achieved by the United States. The index averaged 1.76 for the Middle East region, with Israel ranking highest at 2.26, followed by the United Arab Emirates (2.17), Kuwait (2.12), and then Bahrain, followed closely by Lebanon (2.00). Bahrain ranked slightly above the European mean index of 2.01. The index, which had a ceiling of 3.25, gave South America an overall rating of 1.79, Asia (1.38), and Africa (0.84). In determining the e-government index for individual countries, the UN study took into account demographic statistics and factors such as the level of human development, Internet, PC and mobile penetration, ICT infrastructure, and the degree of government online presence and level of services. The UN also determined a group of public sector organisations to identify their IT infrastructure, online presence and level of bureaucratic, namely the Ministry of Commerce, Ministry of Health, Ministry of Labour and Social Affairs, Ministry of Education, Ministry of Municipalities, Central Informatics Organisation (CIO), and Civil Service Bureau. These organisations are developing government bodies in Bahrain that work

to improve their ICT infrastructure and modernise business processes and operations continuously in order to enhance their quality of services provided to citizens. Three of these organisations were selected as case studies and are highlighted in Table 5.2: Central Informatics Organisation (CIO), Ministry of Labour and Social Affairs (MOLSA), and Ministry of Commerce (MOC). In the next section, the researcher analyses their online presence by examining their e-government portals' contents, functionalities, interactive level, and degree of online electronic services presence provided to constituents to evaluate their e-government maturity level.

5.3 Evaluation of E-government Portals in Government Organisations

The Internet continues to increase in popularity among public sector organisations, and has reached a high penetration rate in Bahrain compared with other Arab World countries. The Madar Research Centre, which predicts 25 million Internet users in the Arab World by 2005, presently places Bahrain second to the UAE, with a 22% Internet penetration rate, rising to 32% penetration by 2005. Many government organisations in the Kingdom of Bahrain, such as Ministries, municipalities, agencies and governorates, have begun to present their information and news through the launch of government websites. The researcher will propose an evaluation framework in this section to analyse a selection of government organisations' websites that play an important and direct role in the provision of citizens' services. This evaluation will illustrate the maturity level of the e-government portals in government organisations and the degree of progress made by organisations towards e-government implementation.

Various authors have conducted studies to assess the implementation status, the quality of e-government services, and the maturity of e-government portals, for example Gupta and Jana (2003), Ho (2002), Holiday (2002), Kaaya (2004), Kaylor *et al.* (2001), La Porte *et al.* (2002), Mosse and Whitley (2004), and Reddick (2004).

La Porte *et al.* (2002) endeavoured to measure the concept of organisational openness as a result of implementing e-government services. They conducted a cross-national comparison of websites using the Website Attributes Evaluation System (WAES), examining such attributes as ownership, contact information, organisational and operational information, and interactivity. Holliday (2002) undertook a study to evaluate the e-government implementation

progress of 16 states in East and Southeast Asia. Holliday (2002) analysed government sites and homepages by measuring their visibility and utility. Ho (2002) supplemented a survey study with content analysis of city websites in the United States to determine whether cities were reinventing their local government. Kaylor *et al.* (2001) used e-government scores to benchmark the implementation of e-government services among various cities in the United States. Kaylor *et al.* (2001) evaluated web sites according to the functions and services that organisations provided.

In this study, the proposed evaluation framework of e-government portals will be based on the stage of growth model proposed by the researcher in Chapter 3, in conjunction with a content analysis of organisations' portal services and functionalities. This will integrate the functionalities explained in Table 3.3 that characterise each adoption stage individually and some of the parameters used by several of the aforementioned authors (e.g. Kaaya, 2004; Kaylor *et al.*, 2001; Reddick, 2004). Utilisation of both the content analysis method and stage of growth model will assist more precise evaluation of government portals, and help to determine the existing stage of the e-government implementation process for each organisational portal based on the four-stage model, namely government information delivery, one-way service delivery, two-way service delivery, and integrated e-government portal.

Evaluation of government portals is focused on the websites of key government organisations headed by the Cabinet Office in Bahrain, which provide active and direct services and information to citizens and businesses, such as the Ministry of Commerce, Ministry of Health, Ministry of Labour and Social Affairs, Ministry of Education, Ministry of Municipalities, Central Informatics Organisation (CIO) and Civil Service Bureau. The study will analyse and assess each of the identified government organisations' portals by employing a combination of selected criteria and functionalities categorised under each stage, as shown in Table 5.1.

The analysis and evaluation framework for government portals was conducted over a period of 4 months, which allowed the researcher to define the degree of maturity and identify any growth in portal contents. This also allowed examination of the interactivity level of information, updated services and news provided, and any new functionality added to the organisation's portal that could upgrade it to the advanced stage.

As discussed in Chapter 4 and presented in Table 4.6, data were collected from the online published reports of these organisations, examining their websites, news items through local newspapers, as well as through personal interviews with officials from three governmental organisations, the CIO, Ministry of Commerce, and Ministry of Labour and Social Affairs, the targeted case studies for this research (highlighted in Table 5.2).

Adoption of parameters presented in Table 5.1 was based on the stage of growth model proposed by the researcher (see Chapter 3) and from the contents analysis models that extended from Kaaya (2004) and Reddick (2004). Table 5.1 summarises the contents analysis and parameters for the evaluation of e-government Ministries' portals in the Kingdom of Bahrain. The first column indicates the stage of implementation or the maturity level of each e-government portal, the second column shows the parameters that characterise the boundary of each implementation stage, while column three presents the functionalities of website content associated with each parameter which can help to identify the progress level of portals.

Stage	Parameter	Functionalities
Stage 1	Standard Information	Information about services and transactions provided
		Information about organisational structure and missions
		Information about organisation's publications and functions
		Hours of operating, mailing address, phone and fax numbers and directions
	News	Updated news about organisational activities
		News about new vacancies and positions
	Links	Website links to other governmental organisations
		Website links to relevant private organisations
Language	Arabic Language	
	English Language	
Stage 2	Dynamic information	Fresh information and services updated regularly
		Facilitating information retrieval from organisation's database
		Online statistics and reports
	Contact information	Organisation officials' e-mail addresses and phone numbers
		Provide online interactive discussion with officials and constituents
	Interactivity (One-way communication)	Provide user search engine
		Downloadable materials or application forms for manual completion
		Interactive feedback form
Stage 3	Interactivity (Two-Way communication)	Online request for some services and data from organisation
		Ability to retrieve and store information and services from and to the organisation's databases
		Incorporate documents management system for documents exchange
		Online request and delivery for government records
		Record management system to personalise citizens' information
	Transaction	Online communication with elected individuals and appointed officials
		Online registration for use of certain services
		Online completion and submission of application form
Stage 4	Transaction	Online payment using payment process engine
		Online acknowledgment after completion of payment transaction
		Includes all above functionalities and attributes through one-stop government portal that provides seamless, integrated and consistent government information service

Table 5.1: Evaluation Framework for E-government portals

The existing content analysis literature on e-government indicates that many government organisations are in the initial stages of the e-government implementation process, primarily between Stages 1 and 2. Similarly, the results of this study reveal most e-government projects in Bahrain's government organisations are situated between these stages, according to the researcher's proposed stage of growth model for e-government, as presented in Table 5.2. Only a few government Ministries, notably those concerning business regulations have moved into the third stage: Two-way service delivery, online service delivery, with end-to-end online transactions between government and citizens/business.

Table 5.2 below shows the results derived from the evaluation of e-government portals according to the analysis parameters presented in Table 5.1 which ranks the development and maturity degree of e-government implementation of seven government organisations. Table 5.2 then determines the existing implementation stage approached by government organisations according to rank of achievement degree: Full functions achieved, Most functions achieved, Few functions achieved and No functions achieved that presented by ■, □, □ and X respectively, through examining the services and functionalities provided by organisations' portals.

Stage of Growth Model

Government Organisation	URL	Stage 1					Stage 2			Stage 3	
		Standard Information	News	Links	Language	Dynamic information	Contact information	Interactivity (One-way com.)	Interactivity (Two-way com.)	Transaction	
Ministry of Municipalities	www.municipality.gov.bh	☐	☐	X	■	☐	X	X	X	X	X
CIO	www.cio.gov.bh	☐	☐	■	■	☐	X	X	X	X	X
Civil Service Bureau	www.csb.gov.bh	■	■	■	■	X	X	X	X	X	X
Ministry of Labour and Social Affairs	www.bah-molsa.com	■	■	■	■	☐	☐	X	X	X	X
Ministry of Education	www.education.gov.bh	■	■	■	■	☐	☐	☐	X	X	X
Ministry of Health	www.moh.gov.bh	■	■	■	■	■	■	■	X	X	X
Ministry of Commerce	www.commerce.gov.bh	■	■	■	■	■	■	■	■	■	■

Table 5.2: Evaluation of Government Organisations Websites Based on Contents Analysis and Stage of Growth Model

According to the evaluation results, Table 5.2 shows that most identified government organisations' portals are still situated in the first stage: Government Information Delivery, namely the Ministry of Municipalities, CIO, Civil Service Bureau, and Ministry of Labour and Social Affairs. However, some organisations met most of the requirements of Stage 2, which led them to achieving interactive functionalities and services in their websites, i.e. the Ministry of Health, Ministry of Labour and Social Affairs, and Ministry of Education. Only one government Ministry concerned with business regulations had advanced to the third stage: Two-Way Service Delivery, namely the Ministry of Commerce.

According to Table 5.2, government organisations that have achieved the functionalities required for Stage 1, focused on describing the mission, providing basic information, defining functions and services provided, publishing news, and identifying the organisational structure. Moreover, the entire website contents are in Arabic and English Language. The English is the official language in government and for commercial transactions, and for most citizens in Bahrain, whereas Arabic is the first language of the country.

Table 5.2 shows that some government organisations have achieved the first stage of the e-government growth model, which indicates progress towards e-government and IT culture. Previously, these organisations had been reluctant to disclose information due to concerns about security. Their reluctance gradually changed over the last 5 years as a new generation taken over the responsibility for IT and management positions. Also political reforms of the last five years promoted the transparency of governmental information which affected and encouraged these organisations to provide information to public. This is an indication of political desire in Bahrain to adopt e-government.

Some organisations (e.g. the Ministry of Education, Ministry of Health, Ministry of Labour and Social Affairs) had achieved some functions and interactive services which led them to step towards stage 2, such as downloadable materials or application forms for manual completion, online search engine, list of officials' e-mail addresses, online statistics and reports, and an interactive feedback window. All these functionalities are crucial means of communication between government organisations and their citizens.

The Ministry of Commerce is the only government organisation that has met the entire requirements of Stage 3 and achieved two-way communication services, and provided end-to-end transactions between the Ministry on the one hand and citizens and business on the other, supported by a reliable payment process engine. The portal incorporates sophisticated technologies that allow connection of the front-end applications of the portal with the back-end systems of the organisation (see Figure 5.4). For example, the commercial registrations databases are connected with the website so the user can access his/her record for retrieving, updating and renewing the registration licence. The portal also provides full electronic facilities for the new investor to establish a new commercial project online, from registration for a commercial licence, payment for licence, processing of fees, to acknowledgment of acceptance and approval of the application (more details presented in Section 5.7).

It appears that there is active commitment from government leadership, as shown in the Prime Ministers speech (see Section 5.2), to the adoption of e-government, and also high support from the Ministries' officials to open up a way for e-government implementation. However, these Ministries seem to have struggled with several barriers which prevented full realisation stage of online government information and services provision. If Bahrain's governmental organisations desire is to proceed to the advanced stages of e-government, they will have to overcome the barriers that some Ministries have experienced, such as lack of ICT infrastructure, shortage of qualified staff, complexity of business processes and operations, and resistance from government managers. The researcher, through the three case studies, will focus and identify these barriers and their implications ..

The case organisations have been selected according to the maturity level of implementation stage that has been achieved by organisation. As Table 5.2 shows, the CIO is situated in Stage 1 and is responsible for maintaining government IT technologies and infrastructure. The Ministry of Labour and Social Affairs is situated in Stage 1, but according to Table 5.2, the IT department in the organisation is making good progress towards the implementation of Stage 2 by achieving the parameters and functionalities that address the requirements of this stage. The third case study is the Ministry of Commerce that has much experience in the process of e-government implementation, since the organisation is approaching the highest rank, Stage 3.

5.4 Case Studies' Units of Analysis

This section will analyse the practices of e-government implementation in three government case studies in the Kingdom of Bahrain namely CIO, MOLSA and MOC. The selection of only three cases has been justified since they have provided sufficient information to achieve the purpose of this research. Further case studies would not have provided additional benefits. Selection of the three different government organisations as case studies was also based on the following:

- The maturity level of e-government adoption that each organisation had achieved is presented in Section 5.3. For instance, each case had reached a different maturity stage: the CIO was in Stage 1, the MOLSA had stepped into Stage 2, and the MOC, the most mature case organisation in the research and also in the country, had reached Stage 3. Thus, findings would confirm the validity of the proposed conceptual framework across different levels of e-government progress.
- The nature and category of government services and business functions provided by case organisations to constituents. For example, the CIO interacted with the government sector (G-to-G), the MOLSA provided services to the citizens' sector (G-to-C), and the MOC's services were related to businesses and commercial projects (G-to-B). Therefore, the analysis of the three different organisations' interactions would indicate the applicability of the proposed framework to a wide capacity of government interaction and communication with different community sectors.
- The detailed representation provided in each case study revealed that each case organisation was characterised by differing size and context. The organisational size factor is based on the volume of information and services processing within the organisation and provision to people, and also the number of employees. The MOLSA is one of the largest government organisations among case organisations, and also among government organisations in Bahrain, the CIO is of medium organisation size, whereas the MOC is considered a relatively small government organisation. Therefore, this will validate the implication of the organisational size factor in the process of e-

government implementation as one important sub-factor encapsulated within the organisational factor.

The researcher will examine the validity of the proposed conceptual framework using the case study strategy proposed in Chapter 4. In doing so, factors associated with the proposed conceptual framework will be analysed among three government organisations, and also the implementation stages will be studied as a central part of the proposed conceptual framework. Table 5.3 describes units of analysis that will be presented in the following sections. These units reflect the empirical validation for the components of proposed conceptual framework, namely the stage of growth model, Technology-Environment-Organisation model, and benefits-barriers model. Table 5.3 also illustrates characteristics and context of each case organisation such as level of interaction and e-government maturity level.

Case Organisation	Level of Interaction	E-government Maturity Level	Unit of Analysis	Section
Central Informatics Organisation (CIO)	Government-to-Government	Stage 1	Organisational context	5.5.1
			E-government strategic projects	5.5.2
			IT infrastructure and Skills	5.5.3, 5.5.5
			Organisational behaviour	5.5.4
			E-government implantation process	5.5.5, 5.5.2
			Organisational size	5.5.5
			Competition pressure	5.5.4
			Top management support	5.5.4
			Financial resources	5.5.4
			E-government benefits	5.5.6
			E-government barriers	5.5.7
Ministry of Labour and Social Affairs (MOLSA)	Government-to-Citizens	Stage 1 and stepping to 2	Organisational context	5.6.1
			IT infrastructure and Skills	5.6.2, 5.6.6
			Organisational behaviour	5.6.3
			E-government implantation process	5.6.4
			Organisational size	5.6.3
			Competition pressure	5.6.4
			Top management support	5.6.3
			Financial resources	5.6.4, 5.6.6
			E-government benefits	5.6.5
			E-government barriers	5.6.6
Ministry of Commerce (MOC)	Government-to-Business	Stage 3	Organisational context	5.7.1
			MOC's strategic plan	5.7.2, 5.7.5
			IT infrastructure and Skills	5.7.3, 5.7.5
			Organisational behaviour	5.7.4, 5.7.7
			E-government implantation process	5.7.5, 5.5.7
			Organisational size	5.7.1, 5.7.4
			Competition pressure	5.7.5
			Top management support	5.7.1, 5.7.4
			Financial resources	5.7.7, 5.7.5
			E-government benefits	5.7.6
			E-government barriers	5.7.7

Table 5.3: Classification of Case Studies' Characteristics and Units of Analysis

5.5 Case Study One

Organisation	Level of Interaction	E-government Maturity Level
Central Informatics Organisation (CIO)	Government-to-Government	Stage 1

The CIO is a government body that runs, manages and maintains central government computer systems and infrastructure in the Kingdom of Bahrain. As the custodian of many government information systems, it is responsible for regulating information technology within government and for optimising the use of the Government Data Network (GDN) that forms the backbone of the Bahrain e-government initiative.

5.5.1 Context of CIO

The structure of the CIO originated in 1978 when the Directorate of Statistics was established by government order. In 1979, the CIO installed the first government computer centre to administrate government services and support foreign trade, statistical management systems, the census and consumer price index, manage electricity billing, and run personnel and payroll systems within the government.

In 1980 the government assigned the CIO to implement what is called the National Addressing System which provides details of geographic addresses in Bahrain, i.e. House No., Road No., Block No. and Name of City. In the same year, the CIO started the first census in Bahrain based on the National Addressing format.

At the end of 1981, Prime Ministerial Resolution No. 3 stated the major responsibilities of the CIO as to provide centralised computing resources among government, and approve acquisitions for hardware, software and services. Following this resolution, the CIO adopted the main government applications (e.g. traffic system, financial system, and health records management system), and implemented the first government online applications delivered to the central stores' directorate. One milestone achievement was in 1984 when it created the Central Population Registration system (CPR) which includes unique identifiers for people, land and establishments in a central database that can be shared by all government Ministries. Thus, the government of Bahrain started on the first step towards what is called the information society.

In 1993, the CIO issued the first Government Strategic Information Systems Plan (SISP) which emphasised modernising connections between Ministries and the CIO by improving the government network infrastructure. Accordingly, the new Government Data Network (GDN) was developed in 1995-1996 to connect various government Ministries and directorates, and to enable any government department connected to the GDN to access applications and data resources of any Ministry, if authorised, such applications are CPR, Traffic and licensing system, and immigration system (see Table 5.5 for more government applications). The first connection went live in March 1997, and the associated Network Operations Centre (GDNOC) came online in 1998. By December 1998, the GDN had connected more than 60 government remote sites. Today, the GDN connects nearly 200 remote sites distributed all over Bahrain (see Figure 5.1). The General Director of IT in the CIO, in an interview with the researcher in April 2004, emphasised the role of the GDN in government, when he stated:

“The availability of the centrally managed GDN to transport data reliably and securely between different locations is now fundamental to most new government IT projects. In order to provide the best possible quality service to customers a major update programme for the GDN has been approved and is now under way”.

This perspective was supported by the Undersecretary assistant of the CIO, who reported:

“The GDN has developed into one of the most advanced networks in the world. The GDN already links all Bahraini government Ministries, irrespective of position, delivers government wide financial management and human resource systems as well as government wide email and internet access”(Interviewed by the researcher, April 2004).

The GDN has recently introduced Fibre, Infra-red laser and Microwave radio technologies within its infrastructure, and MPLS (Multiple Protocol Label Switching) to cater for any type of data to any node point with a guaranteed reliability factor. The security of design of the GDN is stringent, employing all available technologies for demilitarised zones, firewalls,

access controls, proxies and other procedural components. Figure 5.1 outlines the timeline of CIO e-government projects and process towards development of its ICT infrastructure.

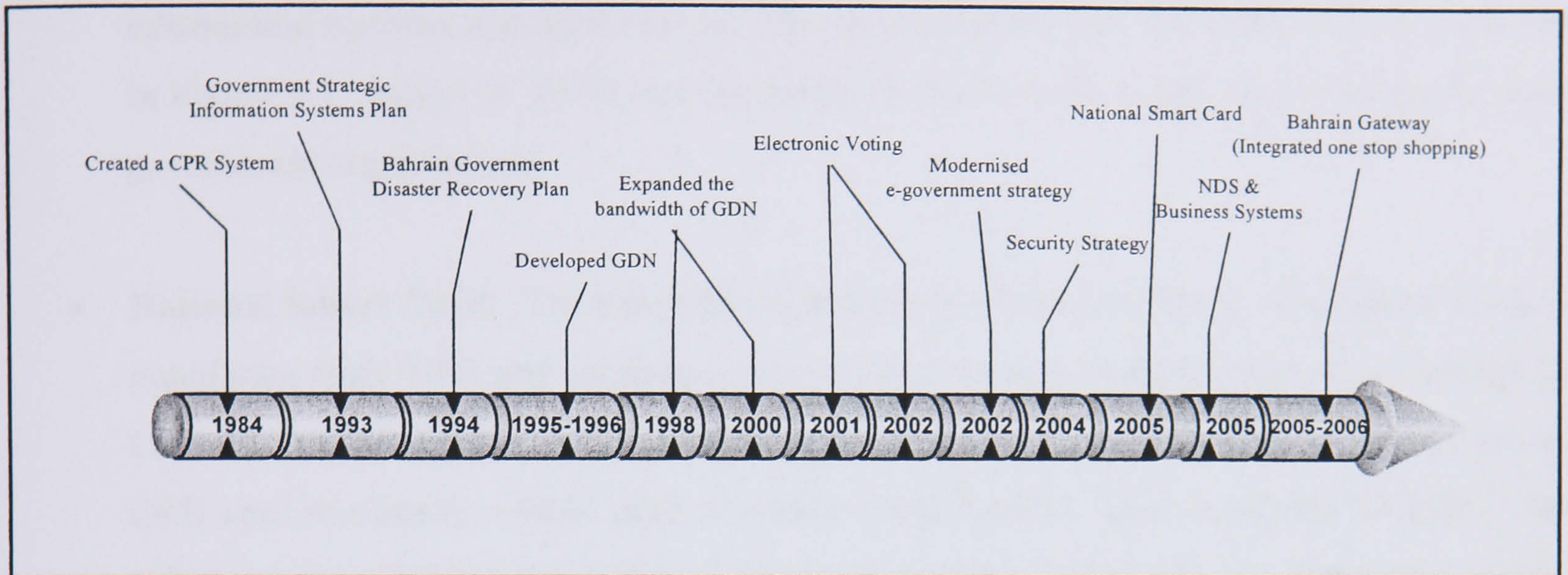


Figure 5.1: CIO E-government Projects' Timeline

According to interviewees, the CIO has recognised the need for improved information and technology infrastructure as the primary engine for revolutionising how the CIO fulfils its basic e-government mission. Therefore, the CIO is required to enhance its efficiency and improve the performance of traditional government operations. Due to many disparate legacy applications and mainframe systems (e.g. Traffic and licensing, CPR systems, etc.), the need exists to re-engineer, update and integrate core applications to provide enhanced business and citizen access to information and services while ensuring cost containment and increased productivity.

5.5.2 E-government Strategic Projects

The CIO modernised the e-government strategy plan in 2002 by highlighting the significance of integrating all disparate government organisations' websites into one single gateway for government services and information. The plan also states that each citizen will have his/her own government homepage and e-mail account that represents a personalised profile for online services and transactions. The plan focuses on six key projects that should be implemented to reach what is called the Bahrain Gateway (a one-stop integrated portal):

- **Government Data Network (GDN):** represents a milestone for e-government implementation. As discussed in Section 5.5.1, it connects more than 200 remote government sites, irrespective of platform, to exchange data through centralised information systems and applications. The implementation of the GDN project, as shown in Figure 5.1, started in 1995, and currently no major work is left since it connects most government organisations.
- **National Smart Card:** The Kingdom of Bahrain has been collecting information about its population since 1981 and created a dedicated system to manipulate these data through the CPR information system. It has led the region in personal identification cards. The current CPR card is already widely used to verify identification when applying for public and private sector services. The new e-government strategy for Bahrain has introduced a multi-functioning smartcard. The CIO started to implement the smart card project in late 2003 and is expecting to issue one to every person in the country in early 2005. The smartcard will replace the current CPR card that integrates and combines data from the CPR card, driver licence, personal ID card, passport, health care card, and debit card. The project is in the implementation phase, and many public and private organisations are cooperating to adapt their infrastructure and services with the functionality of the smartcard, including the Central Population Register Department (personal data), Statistics Directorate (provides the latest census data), Traffic and Licensing Directorate (driving licence), Immigration and Passports Agency (visa and passport), Ministry of Health (health records), Ministry of Interior (finger prints), educational institutes (educational records), local banks (e-purse) and public key infrastructure (PKI) identification and authentication application (authentication and digital signature). According to the CIO, 500 card reading units will be installed at various Ministries to support the new system, and more than 100 portal devices will be initially distributed to personnel working in the traffic directorate, ambulance and other mobile services. Card holder privacy is a major concern during the implementation process of this project; however, the CIO has emphasised that privacy will be guaranteed by ensuring that a particular department of a ministry only can access information on the smartcard by entering a special code, and will not be able to trespass or explore other unrelated files. The implementation of the PKI will promote the government mission by ensuring that the confidentiality of sensitive data is maintained by enabling a higher level

of service through improved processing time and data accuracy, and also by providing a strong authentication and digital signature capability to guarantee secure data transmission. The head of the CIO, when asked about the smartcard in an interview with the researcher in April, 2004, commented,

“Card holders will be able to use the new smartcard for a wide range of secure financial transactions, such as bill payments, money transfer, balance inquiry and cash withdrawals. The card will have 32 kilobytes to 64 kilobytes of memory and it can be upgraded with new applications whenever needed”.

Table 5.4 lists the motivations that have led top management to consider the smartcard project as a strategic objective through the e-government initiative.

Smartcard Motivations	
1.	Supporting evolving Bahrain e-government strategy
2.	Reducing data errors in government records by dynamic loading and biometrics
3.	Encouraging use of electronic business methods between government and constituents
4.	Implementing just one card across entire government
5.	Increasing efficiency and control, and reduced costs, compared with current systems
6.	Providing public with better, secure and convenient access to government services
7.	Topping up e-purse feature from local ATM
8.	Improving ability to track and detect suspicious activity across government systems

Table 5.4: National Smart Card Project Motivations

It has been noted that the CIO is rushing employees through the project implementation to accomplish it as soon as possible. This will be explained and justified in Section 5.5.5.

- **National Data Services (NDS):** This project has been derived to supersede the former Bahrain legacy national dataset to achieve a unified dataset based on the IBM DB2 database platform, allowing intra-governmental access to information. The government's strategic information plan states the need for a unified dataset across government organisations. When interviewed by the researcher in April 2004, the technical services director indicated that the decision to create a national dataset emanated from the CIO's

belief in the importance of providing clean and accurate data to those who are required to make decisions in the Kingdom. He commented:

“At present, every ministry has its own set of databases which may be stored manually or as paper in files. If the CIO creates databases individually then they will not meet the standards of quantity and quality of information and also will not be updated on time when required. Hence, the aim of the NDS project is to unify the database in order to collate the joint information and data of all Ministries in one file, which will be linked to the files of various Ministries”.

Using the stored procedures within the NDS allows access to requested information without external programming support, leading to highly dynamic information processing throughout the government. For example, the NDS communicates over a government-wide data network using an integration engine, e.g., the MQ series that allows Arabic information to be translated to any packages and platforms in use. The NDS project will successfully overcome the duplication of government data and processes, and also ensure data integration. The NDS's project development is evolving within the e-government project. The requirements of the project have been laid over the last few years, and the remaining of implementation phases are still running.

- **Security Strategy:** The government of Bahrain has allocated about 20% of the total e-government budget for security projects to ensure the confidentiality of government information transmission, and also the privacy of personal data. Constituents' information is protected based on the IBM advanced mainframe-based security server system. The Director of Computer Operations in the CIO said,

“We believe that security is also about people and their relationships with security standards, procedures and policies. A huge effort has already been expended by the Bahraini government in this area, the work continues at a pace preparing new measures for e-government” (Interviewed April, 2004).

A comprehensive and sophisticated disaster recovery plan (DRP), implemented in 1994, as shown in Figure 5.1, has been updated to fit the e-government strategy requirements to ensure business continuity and operational contingency. The CIO has executed 65% of the plan, and hence claims that continued availability is ensured by mirrored configurations, enterprise storage architecture, fully tested procedures, and regular exercises simulating disaster type events. According to a member of the e-government project committee in the CIO,

“The e-government project will redesign and reengineer the DRP to continually ensure that no interruptions occur to government operations for e-government”

(Interviewed April, 2004).

Recently, the CIO has signed an agreement with Trend Micro, one of the world's leading Internet security providers, to provide comprehensive protection against virus infection of government servers. The next phase of the security project is to issue an electronic signature to the Bahraini population, business clients and constituent Ministries, municipal authorities, and thereafter use electronic authentication to ensure access rights to information and access denial to all who are not authorised. As discussed in the smartcard project, the digital certificate and other public key infrastructure (PKI) information will be stored on a national multi-application smartcard.

- **Government Business Systems:** The CIO hosts most government business systems at the Bahrain National Computer Centre. Most of these systems are being re-engineered by CIO staff (e.g. the CPR system, Financial system, licence and traffic system) as part of the e-government applications' transformation project to ensure all governmental applications are portable and will work on a single integrated application approach across Linux servers. Also, the systems' development life cycle will use leading edge software for storing business rules and generating business logic. The Director of Computer Operations stated that testing of the new business systems must be comprehensive:

“E-government contains a testing lifecycle that includes: unit, system, integration, user and acceptance testing. This will take most of the project time and effort. A refined approach to the implementation of new business processes is being taken by using NDS information views and profiles. In this way, the services and logic can be made ready before the new e-government business processes are implemented” (Interviewed April, 2004).

- **Central Servers:** The aim of this project is to develop integrated government architecture platform by binding together the physical requirements at the central mainframe, servers, storage management systems, operating systems and client terminal levels required to implement the architecture for e-government. Interviewees reported that the platform architecture will be the key driver towards the capability of adopting the Bahrain Gateway single portal, which considers the last stage in the e-government implementation (i.e. Stage 4). This project will provide a single point entry for all users and access channels, the portal will be comprehensive and attractive to use, since it will connect government database systems to the front-end applications. The portal will also address multi-lingual support in order to meet Arabic and English speakers' requirements. When interviewed by the researcher in April, 2004, one of the e-government members said:

“Our vision is that, via this portal, government services will be completely automated allowing point and click access to complex services without concern about the structure of government organisations”

This project will also provide directory services through the proposed single portal that will be taking novice Internet users to the appropriate business access points. Business access points will be complete services, no longer depending on the knowledge of the Ministry business area but based on simple directory services. Electronic payment at the portal has raised much concern, but will be secure and also utilise the e-purse function of the national smartcard project.

5.5.3 IT Infrastructure

One of the major roles of the CIO is to supply the most appropriate and reliable infrastructure for government organisations by providing the communication technologies to connect their departments with other organisations through the GDN. In addition, the CIO is also determine and then install the necessary network tools (e.g. switches and routers) to integrate organisations' business processes with the government applications, maintain their fundamental applications, provide assistance in evaluating the required IT solutions to fit their business process, support them in case of technical problems, and help them to access the Internet and e-mail. As discussed earlier, the CIO has kept the key applications and information systems that run government operations in a secure site, and is responsible for maintaining them as well as upgrading them if necessary. However, many of these systems and applications are still legacy and run under a mainframe environment such as IBM CICS and WANG.

Currently, government organisations can access different government systems' applications throughout the GDN infrastructure. However, many are not web-enabled and require additional middleware tools to support the connection and data transmission. This indicates that the readiness of IT applications and integration capabilities in organisation can drive the process of e-government implementation and then influence the movement from stage to another. The CIO has committed itself to maintaining these business process applications in government and developing them in order to convert them into web-based applications. Table 5.5 describes these applications with their main functionalities and illustrates the progress of development.

Government Applications	Main Functions	Web-enabled
Immigration and Passport Systems	<ul style="list-style-type: none"> • Register arrival and departure movements across borders • Maintain and manipulate passports records for citizens • Manage and issue VISA applications • Control borders against unwanted people 	No
Traffic and Licensing Systems	<ul style="list-style-type: none"> • Store licence records for all citizens and residents • Maintain and manage vehicles' details in Bahrain • Register tickets, traffic violations, and convictions 	No
Central Population Registration Systems (CPR)	<ul style="list-style-type: none"> • Register identifiers for people, land and establishments in Bahrain • Run census application for people in Bahrain • Store, manage and maintain full details (e.g. name, age, marital status, occupation, address, etc.) for each individual in Bahrain • Help to produce CPR card 	Under development
Customs and Port Systems	<ul style="list-style-type: none"> • Register exports and imports items • Classify items and their applicable tax • Notify and publicise prohibited items among borders • Calculate total amount of tax 	Yes
Commercial Registration Systems	<ul style="list-style-type: none"> • Register all commercial licences • Store and manage commercial properties' records • Help to issue new commercial registration 	Yes
Labour System	<ul style="list-style-type: none"> • Register all foreign labour in Bahrain • Manage and control the application for requesting new foreign labour • Register and maintain employer records 	No
Financial Management Information Systems	<ul style="list-style-type: none"> • Asset accounting, tracking and management • Allow processing for requisition, bid and payable • Manage and control purchase orders and contracts • Inventory control • View financial statement details for each organisation's projects 	Yes
Human Resource Information Systems	<ul style="list-style-type: none"> • Store and maintain records for government employees • Register and process employee applications for leave, remuneration, and retirement • Provide employee background for top management 	Yes
Ministry of Electrical and Water Application	<ul style="list-style-type: none"> • Store and maintain consumers' records • Produce electrical and water bills • Report problems and faults of devices 	No
Ministry of Health Applications	<ul style="list-style-type: none"> • Store and maintain patient records • Manage physician records and their responsibilities • Classify patients' records according to their health centres 	Under development
Government-Wide E-mail and Portals	<ul style="list-style-type: none"> • Assign for each government employee's e-mail account • Provide required IT facilities for government organisation's portal • Control and manage e-mail accounts 	Yes
Government wide Secure Internet Applications	<ul style="list-style-type: none"> • Internet and web servers • Hardware and software firewall • Proxies • Control access device 	Yes

Table 5.5: Government Information Systems Hosted by CIO

According to Table 5.5, there are six applications not mature for e-government projects since they are not web-enabled, two of which are still under development to upgrade. As a result, these systems, which are active applications for citizens, cannot be connected to the e-government portal, hence will impact negatively on the e-government implementation process and will delay the execution of the proposed e-government strategy timeline (see Figure 5.1). The interview with the Director of Computer Operations, Head of Technical Services and Applications Developer, revealed that these systems will be upgraded into web-enabled applications to meet the requirements of e-government projects. Many are in progress (e.g. CPR and health applications), and will be completed shortly, but approximate deadline was not specified.

Since most government organisations have their own infrastructure that runs their own systems, there are many incompatible and heterogeneous information systems across government. The result is highly complex and disaggregated e-government information systems architecture. The CIO has formed a specialised project team to study the business processes in some key government departments, such as Immigration and Passport, Health, and Traffic, to find the best solutions to convert and reengineer their systems to meet the requirements of e-government projects. However, this project team faces some barriers that restrict their work and consequently delay the implementation plan. These barriers will be discussed in Section 5.5.7.

Although the CIO is implementing some integration solutions from Microsoft (Com DE COM) to connect different systems and applications across government, there are still some integration problems. Recently, the CIO adopted new integration technology from IBM based on the Enterprise Application Integration (EAI) approach, called the MQ series, to address the integration problems, but it still does not cover all governmental bodies. Figure 5.2 illustrates the architecture view of public and private organisations that are connected to the back-end systems in the CIO throughout the GDN infrastructure.

The interconnection between the CIO and other government organisations' servers is equipped by CISCO switches and high speed routers that maintain the connection of government data networks. The CIO is also using Frame Relay and infrared technologies for data transmission. Currently, it is implementing MPLS technology to support the data transmission Ethernet speed of the GDN, with a high bandwidth reaching 100 MB.

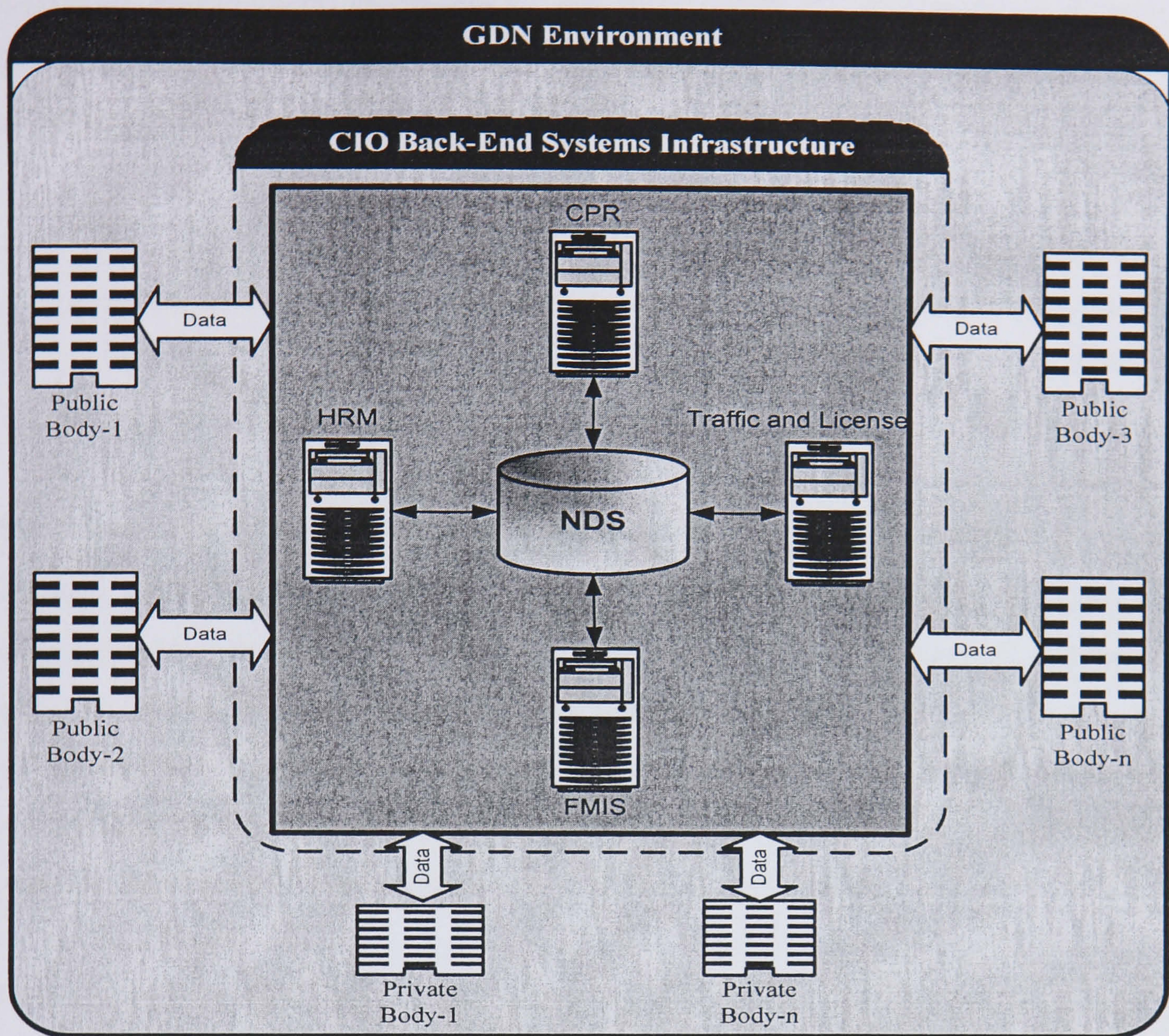


Figure 5.2: Government Organisations' Integration through GDN

The CIO has been working with IBM as a strategic partnership to drive the delivery of web-enabled applications to unify the government information infrastructure, and hence provide powerful services to government and citizens using secure hardware, networks, Internet, and software platforms. The project integrates Bahrain's back-end systems, such as National Database, Immigration and CPR systems, Decision support systems, and Customer Relationship Management (CRM), and supports the introduction of a national smartcard system that will give citizens access to information, services and government facilities.

The foundation for the infrastructure includes Linux platforms which use open source software as an engine within the IBM eSeries and zSeries servers as a backend platform; IBM WebSphere as the middleware, application server, e-business and infrastructure software; the IBM MQSI (series) as an integration engine based on the EAI approach; IBM Tivoli as an

enterprise management environment; and IBM DB2 as the database platform. IBM WebSphere on the IBM eServer zSeries 640 will be used as a testing and development environment. The manager of computer operations said,

“The decision to build e-government strategy on the open standard Linux platform gives confidence in the long-term stability and ongoing versatility of choice that the government can move an entire national resource to a technology base” (interviewed in April, 2004).

The Linux architecture, according to the manager of computer operations, will result in dynamic resource allocation based on business objectives and dynamic scalability to handle unpredictable enterprises' e-business workloads. It also processes business critical applications, and is able to manage the requirements of large numbers of users who need to access multiple applications and data sources typical of the e-government environment. The operating system for this architecture will uniquely allow CIO to specifically determine and maintain the level of service provided to its users by applications.

Entire legacy applications will be transferred to the IBM AD toolset. Visualage for Java, WebSphere Studio Application Developer, and the e-government platform will be hosted using the IBM WebSphere Application server and MQ series for transaction processing. Tivoli will be used to manage the infrastructure, using Tivoli Netview and Tivoli Storage for the GDN and security requirements. Linux, WebSphere and MQ series technologies will enable the CIO to achieve its vision for open standards deployment, and newly developed Linux applications will be consolidated over time on the IBM eServer zSeries 800, consisting of WebSphere on Linux and DB2 on Linux, providing better systems management, security, and performance, and reducing complexity.

At the government level, the researcher observed that the CIO has adopted architecture components for e-government from a single vendor, Gulf Business Machine (GBM), the sole distributor for IBM products and services in Gulf countries. The reason for using only GBM solutions is satisfaction with the overall functionality and support. Further, the adoption of the same vendor results in reducing complexity of the CIO IT infrastructure, and thus in better

support management, reducing maintenance, upgrading efforts and time, and consequently costs.

The communication infrastructure of the CIO is well maintained. Advanced techniques have been implemented to increase the bandwidth, and speed up data transmission across government organisations (e.g. Infrared, MPLS), as indicated by interviewees and other government organisations staff who referred to the increased speed of data downloading. These technical developments meet certain characteristics and requirements of the e-government implementation stage, specifically the government integration stage, Stage 4 (see Chapter 3). However, to date, there has been no evidence of development in across-agency integration to utilise the potential of the reach services' infrastructure through the e-government portal to provide services to citizens and business.

5.5.4 Organisational Behaviour towards E-government Adoption

During investigation of the CIO, the researcher found the CIO's top management taking responsibility for implementing e-government across public sector organisations in Bahrain, although no explicit decision from the Cabinet Office had assigned a particular government body responsibility for e-government implementation. The organisation's officials justified this situation on account of the fact that the CIO's natural role is regulating IT infrastructure and other IT issues in the government of Bahrain. Hence, the only government body that can handle the implementation process of e-government is the CIO. Therefore, the CIO's top management had appointed four working groups to be responsible for the implementation of e-government projects called project implementation teams (PITs), which include a technical management team, business process team, change management team, and security team (PITs will be discussed in more detail in the next section, 5.5.5).

However, at the time of writing this dissertation, all the working groups were engaged in the implementation of the national smartcard project. As mentioned in previous sections, the national smartcard project is one of the key components of the e-government strategy programme, but is consuming 80% of the CIO's resources. The CIO has declared that implementation of the national smartcard project is its main priority. It intends to issue it as soon as possible to become the first country in the region to use the smartcard. Hence, it is

devoting most of its physical, human, and financial resources to redesigning the business processes and developing the necessary applications. Thus, all working groups should report the progress of the project implementation to the head of the CIO. This suggests that competitive pressure is playing an important role in the implementation of e-government projects. However, other e-government project programmes (e.g. National Data Services, Government Business Systems, Single Government Portal) stated in the government strategy have been frozen, which has negatively impacted on coordination with other government organisations to implement the e-government projects, and consequently delayed progress on the single e-government portal.

According to interviews and case observations, less than seven months have been given to the project teams to complete the first phase of the smartcard project. This includes reorganisation of the government business processes and development of all necessary information systems. Therefore, IT staff have concluded that the predetermined time is not sufficient to allow them to develop all systems and applications, and a shortage of IT staff means they will be unable to maintain the single e-government portal project in parallel with the smartcard project. This suggests that there are some organisational barriers hindering the implementation process of e-government projects, which will be discussed in Section 5.5.7.

The CIO has given due consideration to social and culture aspects of the e-government projects, for example user resistance to new e-government systems and new business processes, user technology preference, the effect of IT on current job descriptions, and user training. This can be seen from the regular presentations and workshops given to CIO staff and to other government organisations that identify the e-government benefits and their positive effects on government operations, as well as training programmes provided by the CIO to government employees.

The support of senior managers has been identified by studies as a critical success factor in all IT innovation adoption, perhaps more than any other factor. For example, the OECD report (2003) found that key issues to be addressed for the successful implementation of e-government include the need for understanding and support on the part of senior management, and the willingness and ability to adopt new ways of working.

It became apparent from the case study investigation that top management, from the Head of the CIO down to the undersecretary and IT managers, provide active commitment and support for the adoption of e-government projects, as is shown by the following evidence:

- Senior managers in the CIO (e.g. Head of CIO, undersecretary, IT managers) are well educated, most have a higher degree in the area of IT, and hence understand the role of IT and e-government in developing government operations. Moreover, they have directly participated in the steering committee for all IT projects, including e-government.
- Training strategy in the CIO is updated regularly by senior managers, who allocate a sufficient budget to train all IT staff and non-IT staff in the organisation to meet the requirements of new systems, according to most of interviewees from the CIO. They also agreed that there is an efficient training programme.
- Top management allows maximum access to organisational resources, supported by Cabinet Office officials, to achieve e-government goals.
- Senior managers strongly emphasise the importance of e-government projects to other stakeholders within government organisations to involve stakeholders in the project process, build support, and minimise resistance.
- Senior managers suppress some types of staff resistance by motivations, rewards, training and knowledge.

5.5.5 E-government Implementation Process

The CIO believes the e-government implementation process should start from the bottom and move upwards (see the e-government architecture framework diagram, Chapter 2). This indicates that the ICT infrastructure for e-government should establish first to provide reliable and effective electronic communication architecture across government bodies, and then a single government portal can develop to provide integrated e-government services. The CIO idea is to completely develop the online strategy and to launch it as a whole, rather than take the incremental approach. The CIO management believes that use of the ICT infrastructure is central to the development of better service provision.

As reported in Section 5.5.2, implementation of e-government projects in the CIO represents the foundation of e-government infrastructure and, as interviewees pointed out, the CIO since 2000 has been examining available solutions to meet the challenge of developing a standardised, reliable, integrated and homogeneous IT infrastructure for e-government.

The Head of the CIO, Shaikh Ahmed Al Khalifa, indicated the significance of IT infrastructure before any further stages, as follows:

“Our leader’s forward thinking and vision will make a range of essential government services available to citizens online, when the infrastructure is fully created and protected” (Interviewed April, 2004).

Accordingly, and as discussed in Section 5.5.3, the CIO is putting extensive efforts and investments into the latest technologies for data and processes transmission across government organisations, such as MPLS and Infrared, as well as deploying advanced EAI solutions using the IBM MQ series. Interviewees agreed that the networking infrastructure is important in order to connect the disparate locations of the government to a centralised repository. The ability to access the Internet is also important for government staff to be able to access information and communication technologies. At the level of internal infrastructure, the CIO has installed client-server networks that reach all parts of the organisation and connect high speed application servers (e.g. e-mail server, domain server, databases, and other applications). These servers are operated through efficient network technology and high speed Internet connectivity, which improves communication and information transmission within the organisation. The infrastructure aspect here completely meets the infrastructure layer of the proposed e-government architecture framework presented in Chapter 2, and some integration aspects across government organisations meet the e-business layer of the same framework. As such, these developments fulfil the requirements for Stage 4 in terms of integration and connection across public sector organisations. However, portal contents’ management problems, and how to integrate this advanced architecture to the front-end portal interfaces applications, have not been solved.

Accordingly, it appears that technical capabilities and the network infrastructure are important factors influencing the implementation process of e-government projects in the CIO.

Implementation of the National smartcard project is consuming the CIO's main resources, as discussed earlier. The CIO views the smartcard as the cornerstone, a necessary step towards fully realising the benefits of e-government to enable citizens to access e-government services (see Section 5.5.2 for benefits of the smartcard). The four working groups mentioned earlier as responsible for implementation of e-government projects consist of IT and administrative staff from different CIO departments and report to the steering committee chaired by the Head of the CIO. The steering committee is responsible for monitoring the progress of e-government projects to ensure that milestones are met and organisational needs are considered. The technical management team is responsible for developing legacy systems and other applications capable of interacting with the new systems to become web-enabled. The business process team reviews and documents the internal management process and workflow for a number of government agencies (e.g. CPR directorate, Passports and nationalities agency, and Traffic directorate), and then exchanges this information with the change management team to identify ways to reengineer and redesign the management process by automating these processes using ICT to gain efficiencies. The Security team is responsible for ensuring the confidentiality of government information transmission and also the privacy of personal data during transaction processes.

Evidence from the investigation and from the researcher's observation indicates that the progress of both security and technical working groups is slow because they are experiencing a shortage of qualified IT staff, since most of their members are graduates from universities and not capable of dealing with such complicated technologies. This emphasises the influence of IT skills on the implementation process of e-government projects in the CIO.

According to Table 5.2, the analysis of the CIO e-government website structure and functionalities shows that it is not up-to-date and does not provide any dynamic information and services to citizens, also due to the shortage of IT staff. According to the Director of Computer Operation, a new PIT will soon be established when the smartcard project is finished. It will be responsible for designing and implementing the one-stop shopping e-government portal and will be called the 'Bahrain Gateway' implementation team. This team will include members from various government organisations and will quantify and then integrate different government services and transactions into one single portal. All services will be provided to citizens seamlessly in this portal. All working groups report to and are

supervised by the steering committee chaired by the head of the CIO, and include undersecretaries and most IT managers, which clearly indicates that top management is part of the e-government adoption process.

CIO interviewees agreed there is a need to fully reengineer business processes across government so as to provide electronic services and transactions online. Since government is a very complex organisation with hundreds of agencies, departments, directorates, commissions, and regulatory bodies, a single government portal is still in its infancy stage (i.e. Stage 1). One reason is that it is difficult to determine which features and applications are most appropriate for creating a high-functioning e-government portal. Another reason is technical; provision of integrated services can only be realised if all public authorities are interconnected and their systems are interoperable. This needs comprehensive technology, systems integration and project management skills. This is another indication that barriers; the lack of qualified IT and management staff, lack of technologies and the complexity of existing systems, all influence negatively e-government projects in the CIO.

According to the above, the CIO has successfully implemented certain requirements of Stage 4 of the proposed stage of growth model. The CIO is connecting Ministries and government departments to each other through the GDN, which are predominantly technical in nature, as discussed earlier. The CPR system, HR system, FMIS and other databases have been connected through the GDN. However, the CIO portal (www.bahrain.gov.bh) offers no functionality to process forms online or any dynamic services, and there is no evidence of cross-agency integration on the portal level.

Although the requirements of Stages 2, 3, and 4 necessitate organisational and management change to achieve service integration, to date the entire effort of the CIO has focused mainly on developing the technical architecture for government organisations.

5.5.6 CIO's E-government Benefits

The benefits discussed in this section reflect benefits derived from the implementation of government organisations integration as the CIO has almost met the technical aspect for this project such as back-end requirements. When the researcher asked interviewees about the

impact of benefits on the decision to adopt e-government, all agreed that benefits play an important role in the adoption of e-government. Then the researcher asked them to identify the benefits from the current phase of e-government implementation and also benefits that are anticipated when the project is finished.

The benefits of e-government adoption are classified extending the model proposed by Shang and Seddon (2000) and Themistocleous and Irani (2001) which proposed a model to classify the barriers and benefits derived from IT infrastructure such as ERP and EAI. These models are considered adaptable for the classification of e-government benefits, since the main purposes of e-government adoption are to automate business processes and integrate IT infrastructures in public sector organisations. Table 5.6 analyses e-government benefits and then classifies them into organisational, operational, technical and external categories. The researcher estimates the level of importance for benefits based on the empirical data analysis, using a scale similar to the one used by Miles and Huberman (1994), with values ranging from: (1) low importance, (2) medium importance, to (3) high importance represented by ○, ◐ and ●, respectively.

Interviewees shared similar perceptions and indicated that integrated systems and applications across government bodies through the GDN accelerate the transmission of data and services across government which, in turn, makes the decision-making process more efficient and effective. It also reduces the cost of managing, running, and maintaining the IT infrastructure through centralising the government systems. One of the operational benefits is the increased productivity of the connected organisations since any required data can be obtained directly and without any permission, hence increasing the collaboration between organisations. Once this phase of implementation has been completed, remaining e-government adoption processes will be straightforward, and citizens will be provided with reliable, quality information and services.

Category	E-government Benefits	Level of Importance
Organisational	Improve internal management and support decision making process	●
	Increase productivity of governmental organisations	●
	Allow organisations to do businesses more effectively	●
	More organised and effective business process	●
	Reduce layers and complexity within organisational processes	◐
	Reduce workload of organisations' employees	◐
	Improve quality and efficiency of data and services	●
Operational	Increase understanding of governmental rules and policies	◐
	Improve accountability and transparency of governmental transactions	○
	Reduce amount of time spent on governmental services' delivery	◐
	Reduce communications costs between organisations	●
	Reduce maintenance cost of ICT tools and applications	●
	Develop new skills and motivations for government employees	○
Technical	Improve connection within and between organisations	●
	Enhance government ICT infrastructure	●
	Provide portability between systems and applications	●
	Improve and control security of infrastructure and privacy of data	●
	Achieve process and data integration	●
	Increase reliability, consistency and accuracy of data sharing	●
	Reduce redundancy of data, applications and infrastructure	●
External	Digitise procurement services from and to business sector	○
	Increase collaboration with the private sector	◐
	Quick processing and response to citizens' needs and expectations	◐
	Provide new services to citizens and business	◐
	Increase collaboration among public sector organisations	●
	Enhanced availability of organisation information and its access to citizens	◐

Table 5.6: Classification of CIO's E-government Benefits

5.5.7 CIO's E-government Barriers

During the case investigation of the CIO, the researcher identified several barriers from interviews and observations that had arisen during implementation of e-government projects in the CIO. Since IT managers in the public sector, as reported in the literature, are reluctant to reveal problems or negative aspects about their projects which could create an unfavourable impression, the researcher changed the interviewee level from executive management level to

middle and lower management employees, since they were more likely to be directly involved and affected by the implementation process in the organisation and willing to disclose problems.

At the time of writing this dissertation, the CIO had connected most public sector organisations to the GDN and integrated many of its systems and applications into the centralised government databases through the MQ series. However, integration problems still existed among organisations, since the MQ series was unable to solve all integration problems across organisations' infrastructure. Moreover, the cost of this product was considerably higher than the budget allocated by the government to solve integration problems.

Further, several key IT systems located in the CIO, namely Traffic, Labour and Immigration legacy systems (see Table 5.5) needed their hardware and software upgraded in order to become web-enabled and compatible with e-government projects, such as NDS, smartcard, and Bahrain gateway, and there was also a shortage of qualified IT staff to do this. The CIO had employed 8 IT staff the previous year; however, most were newly recruited graduates with a computer science background, as observed by the researcher. But, e-government projects' implementation process requires management skills rather than technical skills, especially in the initial stages (e.g. business and management process design and documentation), and there was a shortage of qualified staff in business management analysis and design. Financial resources allocated by the government for updating new hardware and software were limited due to the CIO's use of most of the budget for implementation of the smartcard project. A limited financial budget also prevented the CIO from employing additional full-time staff or external consultants. In addition, recruitment procedures in the Civil Service Bureau (CSB) are complex and time-consuming which, in turn, delays e-government implementation.

Insufficient time and work required to build and maintain the e-government portal was recognised as another constraint to e-government implementation. Since the CIO's main role is to regulate information technologies across governmental bodies and support IT departments' implementation of their ICT infrastructure, as well as maintain the e-government portal, its many roles had proved difficult to manage at the same time, which, in turn, had influenced the effective implementation of e-government projects.

Further, implementation of the smartcard project within a certain period (8 months at the time of the case study) had been assigned top priority by the government, which had led to more responsibilities and tasks for the CIO management. As a consequence, the CIO had decided to stop the implementation of front-end IT tools and systems, and portal configuration, and instead focus on developing plans, designing systems, reengineering business process and evaluating requirements for the smartcard project. As a result, the CIO's management dedicated staff time and resources to this project, so that all other e-government projects had been neglected.

As regards the national smartcard project, interviewees pointed to a lack of sufficient time to analyse and then redesign the workflow and management process for all government organisations. Hence, it had proved difficult to develop alternative information systems solutions, and then redesign these processes to meet the requirements of the smartcard. Consequently, the project team focused on 3 agencies: Immigration and Nationalities, Traffic, and CPR.

During study of the CIO, the results indicated that CIO management had a training strategy and recognised the importance of developing staff skills to exploit the new IT systems and infrastructure e-government provided. However, most training schedules took place during work time, and therefore overlapped or conflicted with responsibilities and workloads assigned to staff. The researcher noted that 3 qualified IT staff had resigned and moved to other organisations during the three months' case study. CIO management staff contended that those who had resigned had received high quality training funded by the CIO budget. The flow of IT staff had aroused the concerns of CIO management because of the high cost of training provided to IT staff.

According to interviews with the business process team, a significant barrier which had arisen was government employees', particularly managers', fears that online transactions would reduce their authority or their power would be lost through the incorporation of new systems, since their jobs would be less important to both the organisation and the public.

From another perspective, organisational culture also presented another barrier to e-government within the organisation, since some departments were reluctant to share their business data or processes with other departments within the same organisation or with external partners. They believed that connection or data sharing would weaken their authority. For these departments and organisations, ownership and control of business data and processes is related to their power, which implies that politics also form a barrier to e-government adoption.

Another problem related to organisational culture was identified: organisations' officials during reengineering the business process had initiated resistance to change. They did not want to change their way of doing business and integrate their IT infrastructure with necessary e-government systems. However, some organisations will be forced by law to change, since the major transactions and processes are functionally dependent on the CIO network infrastructure. For those who resist change, the top leadership's commitment and support will be required to force them to follow the new e-government strategy.

The barriers of e-government adoption in the CIO are analysed and classified according to category and level of importance in Table 5.7. This Table shows, based on empirical data analysis, the most frequent barriers founded in the CIO, the organisational barriers, such as complexity of business processes, cultural and political issues, and resistance to change play an important role in inhibiting the CIO to achieve the e-government projects on specified timeline, as proposed in Figure 5.3, such as the national smartcard, Bahrain gateway, and government business process. However, although there were some indications from the interviewees about some barriers, such as security and privacy, but these barriers, as presented in Table 5.7, did not represent prevention for the implementation progress of e-government projects.

Category	E-government Barriers	Level of Importance
Organisational	Unclear vision and management strategy towards e-government	○
	Lack of coordination and cooperation between departments	○
	Lack of effective leadership support and commitment amongst senior public officials	○
	Complexity of existing business and management processes	●
	Absence of business rules and documentations	○
	Cultural issues	●
	Resistance to change	●
	Insufficient time and amount of work required to maintain e-government projects	●
	Political issues	●
	Resistance to share information and knowledge	●
IT infrastructure	Shortage of reliable networks and communication	○
	Inadequate network capacity or bandwidth	○
	Existing systems are incompatible and complex	●
	Lack of technical standards and common architecture policies, specifications and definitions	○
	Lack of integration across governmental systems	●
	Lack of knowledge regarding e-government interoperability	○
	High complexity in understanding the processes and systems in order to redesign and integrate them	○
	Lack of enterprise architecture	○
	Unavailability of e-government software, systems and applications	○
	Integration technologies of heterogeneous databases are confusing	●
Qualified Staff	Lack of IT training programme in organisation	○
	Shortage of well-trained IT staff in market	●
	Shortage of management skills staff	●
	Lack of employees with systems' integration skills	●
	No time for training staff with new technologies	○
	Complexity of the government's recruitment process	●
	Shortage of salaries and benefits in public sector	○
	Flow of IT specialist staff	○
Operational Cost	Complexity of financial supply process from government	○
	Lack of financial resources in public sector organisations	○
	High cost of IT professionals and consultancies	○
	High cost of required hardware and software	●
	High cost of installation, operation and maintenance of e-government systems	○
	High cost of training and developing staff	○
Security and Privacy	Threats from hackers and intruders	○
	Threats from viruses, worms and Trojans	●
	Insufficient budget for security technologies and solutions	○
	High cost of security applications and solutions	○
	Unauthorised external and internal access to systems and information	○
	Lack of knowledge and vision for importance of security	○
	No assurance that transaction is legally valid	○
	Lack of security rules, policies and privacy laws	○
	Inadequate security level of government hardware and software infrastructure	○
	Absence of privacy of personal data	○

Table 5.7: Classification of CIO's E-government Barriers

5.5.8 Lessons Learned from CIO's Case Study

- The CIO recognises that the development of ICT infrastructure is a primary engine for implementing an integrated e-government portal. Hence, the CIO believes that the reliable services provision should start from the bottom by establishing centralised information systems and then move upwards by connecting these systems to the front-end applications of e-government portal. However, many of government information systems are still legacy and run under a mainframe environment. The CIO need to rewrite, upgrade and integrate these systems in order to connect them to the organisation portal and become compatible with e-government projects to provide active services to citizens.
- The cultural and political issues, resistance to change, lack of collaboration among sections, and insufficient time and IT staff within the organisation create organisational barriers, which represent the most common barriers in the CIO. In order to achieve the e-government projects according to the specified timeline, the CIO need to seek ways to overcome these barriers.
- The commitment and support from the CIO's top management consider one of the critical success factors for the implementation of e-government projects.
- The CIO feels pressure to implement an advanced level of e-government stages when they see more and more organisations in the government making good progress in adopting e-government projects, and therefore feel the need to proceed in order to remain competitive. This creates competition pressure as one of the important factors that affects the process and decisions for the adoption of e-government projects.
- The development of ICT infrastructure in the CIO fulfils the requirements for the implementation of Stage 4 in terms of integration and connection across public organisations. But how to integrate this architecture and information systems to the front-end portal applications, have not been solved, to address the requirements of Stage 2.
- The CIO's capacity to influence e-government development is limited across government organisations, particularly since the CIO is devoting its resources to the implementation of the national smartcard project.
- The CIO considers partnership with vendors is crucial to develop and unify its ICT infrastructure and applications. This will increase the speed of implementation process for e-government projects and also develop new skills of CIO's IT staff.

5.6 Case Study Two

Organisation	Level of Interaction	E-government Maturity Level
Ministry of Labour and Social Affairs	Government-to-Citizen	Stage 1

The Ministry of Labour and Social Affairs (MOLSA) is considered one of the largest government organisations in the Kingdom of Bahrain. It provides many varied services that cover a large sector of the community in the country, such services are supports low-income families, provides social welfare to senior and disabled citizens, and provides jobs for unemployed citizens. Its main responsibility is to implement government policy to enhance the living standards of the Bahraini people.

5.6.1 Context of MOLSA

The basis of the MOLSA started in 1957 when the Agency of Labour was established by government order to be responsible for employing Bahraini labour in private organisations, helping unemployed people find jobs, and following up labour complaints and problems. In 1973 and after independence, the ruler of Bahrain issued an executive order establishing the organisational structure and outlining the objectives and mission of MOLSA.

In 1978, the Social Affairs Department was added to the organisational structure. The aim of the social welfare system within the organisation is to provide high quality and sufficient services to all parts of the population, since all residents in Bahrain are by law guaranteed access to social welfare. This includes the whole span of social services and benefits, as well as last resort income support.

The main objectives of the MOLSA are summarised below:

- To work better towards achieving high rates of social development
- To prepare and develop a national work force to contribute to the development process in Bahrain
- To improve work conditions and achieve a high rate of production in cooperation with workers and employees' organisations.

The Ministry now consists of 12 directorates, each providing a collection of services and transactions to citizens, residents and the business sector, such as social rehabilitation, social welfare, care of the elderly, labour organisation and management, labour inspection, unemployment management, as well as training and promotion.

5.6.2 IT infrastructure

The MOLSA is a large organisation that provides significant services to both citizens and the business sector, and therefore manages a large amount of data used to process services and transactions. These data are also crucial for other government and private organisations' business processes, especially data relating to labour management in Bahrain. Therefore, the data are shared among different governmental organisations. For example, the Ministry of Health has a gateway called SNA that facilitates easy access to social services information for seniors' citizens. The Agency of Passports and Nationalities has access to the labour system which informs about the status of foreign labour. The Ministry of Commerce has access to data provided by the MOLSA, which includes the commercial registrar (CR) and the total workforce employed in commercial projects. The Ministry of Industry and the Civil Service Bureau have links to the system that deal with other services.

The labour information system is hosted in the CIO, as demonstrated in Table 5.5, and the CIO is maintaining this system and integrating it with other government organisations, and also with some private companies in Bahrain using the IBM MQ series. Like many government applications, the labour system is a legacy application that runs under a mainframe environment and is written in COBOL. The CIO is placing the labour system into its e-government project plan to rewrite the code and then upgrade it into web-enabled architecture as part of its e-government strategy (see Section 5.5.3). However, IT employees in the MOLSA are not confident about meeting the timetable set by the CIO for upgrading the system, and want to contribute to the upgrading process in order to identify the technical characteristics and specifications of the application, and also guarantee the time of completion. In addition to the labour information system, there are a number of heterogeneous applications and information systems within the MOLSA, most of which are disparate and incompatible with each other. Each one serves a certain department of the MOLSA through the Local Area

Network (LAN). The LAN does not cover all the departments of the MOLSA and connects multiple systems as a group of disparate clusters. The information systems and applications within the MOLSA are summarised in Table 5.8 below, with a brief description of them and technical characteristics.

Information system	Description	Technical Characteristics
Labour Information System	Manage and maintain labour records in private sector organisations.	<ul style="list-style-type: none"> • Not web-enabled • IBM Mainframe system • Connected to many government and private organisations through MQ series • Written in COBOL
Training Management System	Manage and assign training courses according to registered applications.	<ul style="list-style-type: none"> • Not web-enabled but underdeveloped • Unconnected • Database system • Written in Access and SQL
Social Affairs	Manage and maintain social welfare records including low-income family support, elderly care, handicapped assistance, and social problems treatment.	<ul style="list-style-type: none"> • Not web-enabled but underdeveloped • Connected with some social centres through WAN • Databases system • Written in Oracle 6i
Employment Service Bureau (ESB)	Register and manage applications for employment and keep track of vacancies that match applications.	<ul style="list-style-type: none"> • Web-enabled • Database system • Connected with CPR and CR information systems through MQ series • Connected with social and employment centres through WAN • Written in Oracle8i
ARABDOCs	Store and manage Arabic documents for purpose of research and statistical reports	<ul style="list-style-type: none"> • Not web-enabled • Archive application • Support Arabic language only • Connected with researches and information sections through LAN
Maintenance Application	Store, track and report physical problems and complaints for purpose of maintenance.	<ul style="list-style-type: none"> • Not web-enabled • Connect social centres with maintenance section through WAN • Tracking system • Based on VB code and scripts

Table 5.8: Information Systems and Applications in MOLSA

According to Table 5.8, most information systems are not web-enabled, and therefore can not be linked to the front-end applications of the MOLSA e-government website to meet the requirements of the next implementation stage, Stage 2. Interviews with IT developers revealed that the development for upgrading both hardware and software is in progress to upgrade most applications and systems into web-based applications using the Oracle 9i development package. However, the capacity of the network infrastructure is not sufficient for connecting the information systems and applications to all departments within the organisation. As a result, the citizen has to visit more than one department and wait in a queue to process his/her request. Although the organisation is equipped with a WAN to connect remote social and employment centres to the main servers in the organisation, it does not cover all the centres around the country. Therefore, the development of the network and communication infrastructure is considered essential and it is listed in the MOLSA's agenda to expand the capacity and geographical area.

While the data of the ESB system are stored in an integrated Oracle database, the data are not integrated with some of the older systems, such as the training and social systems. According to the IT developers, double data entry has become a problem for the organisation, since employees now have to enter the same data into as many as two or three systems. IT employees agreed about the necessity of integrating the activities of three departments (i.e. the ESB, Social system, and Training system) on the front-end application since the data have not yet been integrated with existing legacy systems. As a consequence, some employees have to enter the same client data more than once which causes data redundancy and, in some cases, the data become inconsistent.

The organisation has turned to software and hardware vendors and consultants to address the existing IT infrastructure problems (e.g. heterogeneous legacy systems, unreliable network, data redundant) and provide solutions for improving the internal business management processes, which can then support the implementation of e-government projects. One adopted solution is software that can handle and integrate social services into one programme called 'SocialWorks'. This software is designed to manage and manipulate various social services, such as childcare, care of elderly, disability, unemployment insurance, and low income family care. The programme also allows the organisation to customise eligibility rules based on

services regulations, and the software can be linked to the e-government portal as it is a web-based application. The software allows caseworkers to go through a series of questions with their applicants. Based on the applicant's response, case workers click the appropriate box or fill in the correct information. At the end of the interview, SocialWorks generates a report that explains all the benefits that an applicant is qualified to receive. The potential benefit of this programme is that it eliminates the need for the recipients of social services to visit multiple offices to apply for different social services. In the future phase of implementation, remote social centres will be connected to this program through the WAN.

One of the weaknesses of the IT infrastructure in the MOLSA that has been identified is the absence of security and privacy technologies. Although IT managers in the MOLSA did not reveal everything about security issues, the researcher discovered from other employees that one of the systems had been hacked by an end-user inside the organisation which caused the loss of data that day. Other IT employees reported that the security system is not reliable, there are many holes in the IT infrastructure, and there is a lack of necessary technologies to protect the organisation website's contents. Security tools are not available in the organisation, such as firewall, intrusion detection systems, proxies and biometrics systems to prevent interruption in the MOLSA's business process and protect the IT infrastructure and portal from unauthorised access. The organisation's management somewhat recognises and pays attention to the security issues in the organisation, but still does not fully realise the significant role of security technologies to protect the organisation's information systems and website, since there is no evidence that the MOLAS management support the IT department to solve such security problems.

From the interviews and documents analysis, the MOLSA should take into account the major issues about security within the organisation, such as data privacy problems, security of portal contents, confidentiality of information residing in the databases, privacy of data transmission between remote systems, protection of ICT infrastructure, and security for the applications access. Since the organisation is experiencing from shortage of qualified IT staff, in particular in security area, it becomes obvious that there is a need for external consultants to investigate the security issues and perform a risk assessment for the organisation's IT infrastructure in order to provide possible security solutions. Such investigation will allow the IT department to install new technologies and tools that can preserve the security of the e-government portal

and protect the ICT infrastructure, enabling allocation of more interactive services and functionalities in the e-government portal, especially linking the back-end database systems to the portal front-end application.

5.6.3 Organisational Behaviour towards E-government Adoption

The IT team had enjoyed top-level support since the beginning of the e-government project, but that support diminished after organisational reform in 2002 and the appointment of a new Minister to head the MOLSA. As a result, many officials have been changed and the new organisation's management instituted the IT department under the direction of a new administrative office called the Technical Services Directorate which reports to the Undersecretary of Labour and Social Affairs. Thus, the e-government project has been given less attention as a result of structural change. The changes have also produced bureaucratic challenges since any project progress reports or any requests which need to be approved or topics that need to be discussed have to be submitted by the project leader to the IT manager. Then, the IT manager submits them to the director of technical services who will submit them to the undersecretary who, in turn, will forward them to the Minister. By the time any approval or rejection decisions comes back through the same channels, any IT project implementation has already been delayed.

Although the fresh minds of the new management might provide a focus for the new IT strategy and development of information systems, there had been no real commitment and direct support given by the new organisation's officials at the start of the initiate to the e-government projects. This had led to a delay in the progress of e-government projects, reflected in the slow development of the e-government portal. Nevertheless, cooperation and support have been gradually restored between the new officials and IT department over time, and the Cabinet Office support for the e-government initiative played an important role in the restoration of support.

In addition, conflict between managers and authorities in the MOLSA often emerged during the case study. The conflicts emerged during the process of e-government projects' implementation because of different perspectives of roles and responsibilities in the

implementation process, as well as differences of opinion on priorities. This can be seen from the discussion with IT managers and a director of the department. One opinion was to develop the IT infrastructure and strengthen the business processes within the organisation by automating the management operations and incorporating new technologies before providing any electronic services to citizens through the Internet. The second perspective emphasised developing the organisation's portal by providing interactive electronic services and transactions, since the entire development of the IT infrastructure will take a long time to finish. This means the existing e-government portal will become obsolete. The disagreement between IT manager and the Technical Services director at the time of the case study had delayed budget allocation for IT and e-government projects.

The IT manager was more familiar with IT-related issues, in particular e-government projects. The IT manager had been appointed as the e-government project manager in 2001 and this had a very positive impact on the entire project team and contributed positively to the continuity of the project. The project manager was female, the gender of the majority of e-government members, and this had resulted in a friendly and social atmosphere in the department. Her previous education, experience and background in the IT area ensured she was fully aware of all project details. Communication with her was easy, since any team member could arrange a meeting with her at any time by looking at her electronic diary, and setting a date and time when she would be available. She held regular meetings with team members to follow up project progress, which indicated active participation in the e-government implementation process.

As part of the e-government project, the IT manager proposed implementing a new IT project to warehouse all historical and traditional databases of public sector organisations in a single repository. The project had been agreed and supported by members of the IT department and was also supported by top management, including the Minister who realised the significance of this project. The project will cost approximately \$ 189,000 for its implementation stage only. The analysis stage currently being undertaken by the IT department staff through identifying the requirements and the necessary data that should be collected from different sections and also from other government organisations. However, some organisations have not provided all the required data for security reasons. In addition, the CIO is not cooperating with

the IT department since it has not approved the budget of the project, and also refused to provide the MOLSA with CPR data which are most important for running the data warehouse project since, for example, they include citizens' ID number, occupation, education level, addresses, etc.. (Details of the warehouse project will be presented in the next section).

Throughout the project, presentations have been made to top management in order to illustrate the significance of the data warehouse project, and define the dynamic role that it will play within the organisation. The IT manager has also held an open meeting with heads of sections to encourage them to present all available data and documents associated with the project. However, it was suggested that the meeting was more of an information-giving nature than enabling staff to provide input into the project. This will estimate the degree of stakeholders' participation in e-government projects. The IT manager commented on this, stating that if the project reached the design stage and received final approval from the Minister, then she would run more workshops and presentations where staff could actively identify issues and participate in the project.

When interviewees were asked about the behaviour of organisational staff during the meeting towards the adoption of the data warehouse as part of the e-government project, they said that a high level of cooperation among staff had been noted. However, when the process of collecting documents, paperwork and data began, only 5 out of 24 sections provided full documents and related paperwork, while approximately 10 sections resisted providing all that they had, and the remainder claimed they were arranging and preparing the relevant documents.

Generally, interviewees realised the changes would affect the organisation's business process and structure during the implementation of e-government. However, they did not see the data warehouse project as requiring extensive change in the management process. The feeling was that the changes were more about providing additional information than changing business processes, and therefore little needed to be done in the area of change management in the meantime.

In addition, the findings shows that senior managers were aware of the significant importance of changing business processes and developing the infrastructure of IT as a result of the e-government projects, but there was no serious attempt to allocate a sufficient budget for e-government projects despite repeated requests for additional financial resources from the

Cabinet Office. Interviewees were unhappy about the insufficient financial resources that came from government, since these would not cover the cost of essential requirements for e-government projects.

The complexity of organisational structure was an important point raised during interviews. As discussed earlier, the MOLSA is considered one of the largest services providers in the Kingdom of Bahrain, and interviewees referred several times to the complexity of existing business processes of the organisation. According to interviewees, the MOLSA provides a large volume of services directly to citizens and business, and the organisation's information-processing environment is considered high compared to other organisations'. As a result, the implementation process of e-government is not straightforward in the MOLSA and requires continuous collaboration from all departments, since e-government is a far reaching project that has an effect on the entire business processes and workflow in the organisation. In addition, the quantification and decision of which appropriate services and data should be provided through the e-government portal are complex and expensive. This provides a reasonable indication of the influence of organisational size on the process of e-government implementation.

5.6.4 E-government Implementation Process

On 23 June 1998, as an initial step in the move towards e-government, the MOLSA website <http://www.bah-molsa.com> was launched. The website provides detailed information and services to citizens and businesses, respectively. According to Table 5.2, and as discussed in Section 5.2, this website meets the requirements of Stage 1 of the e-government implementation growth model, and has also been substantially redeveloped to provide dynamic information and interactive services as required by Stage 2. Also, during 2002, the MOLSA developed an electronic web version of the complete contact list containing high-level management officials, including the Minister in the organisation, so visitors can access the post-mailing address, e-mail address, fax, and telephone numbers of officials. In February 2003, the MOLSA developed a web version of statistical data and figures illustrating organisational activities, plans, achievements, the real rate of social services' provision, and the employment process. This demonstrates transparency of organisational data. such as

labour market information and statistics, training statistics, employment statistics, population and labour force figures. However, there is no online system in place, as shown in Table 5.2, that can process the application forms electronically or even download them from their server and then post them by mail. Interviewees commented that electronic forms will be the next step in their implementation process, and the development of electronic forms is a potential framework to develop an electronic access interface for the purpose of delivering integrated and interactive services. However, they are facing technical challenges in the development of domain and application servers since, as stated in Section 5.6.2, the MOLSA has limited IT infrastructure capabilities and security technologies which prevents it from providing advanced interactive services through the existing portal.

The actual planning for e-government projects commenced in 2001 when political desire from the Cabinet Office for e-government adoption became evident, and a former Minister of the MOLSA appointed a new manager for IT. However, the reform of the organisation's structure in 2002 temporarily suspended the process of e-government implementation until communication between the IT department and new officials became regular.

Consequently, IT departmental members have approved an e-government projects timeline that outlines the process of IS development and projects over a period of four years. Figure 5.3 shows the timeline of e-government projects' development in the MOLSA.

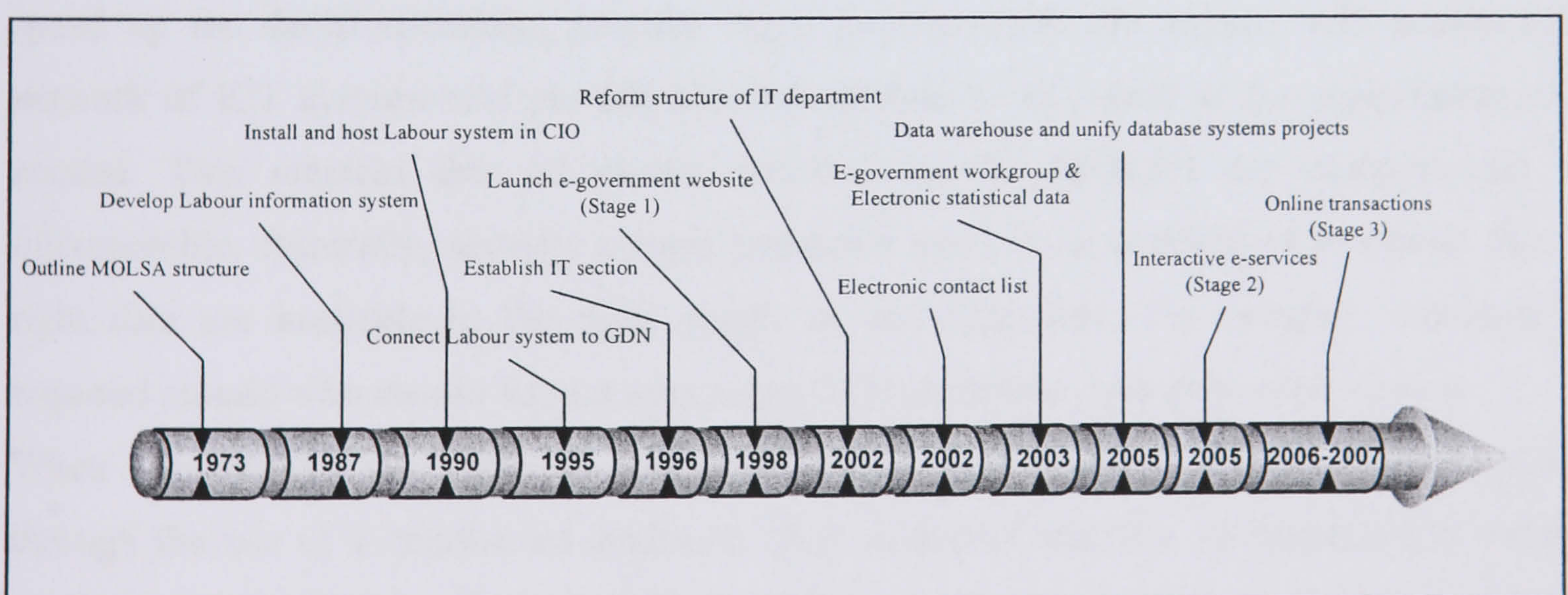


Figure 5.3: MOLSA E-government Projects' Timeline

One major project that the IT department is currently working on, but with slow progress, is connecting local database systems through the use of a centralised database that allows for a degree of vertical integration and the functionality to process all transactions through one window. This development was in response to a clear mandate given to the IT manager and her team to improve the quality of the e-government website and improve the business process within the organisation. However, this project has now become part of another project called "SocialWork", explained in Section 5.6.2, since the output obtained from the SocialWork software will be transmitted automatically to the centralised database. This project will preserve the consistency of data and improve the process of allocating the social services to the right person, for example when a citizen applies for a training programme or employment, and he/she obtains it, then the system will inform the organisation's staff to stop any unemployment insurance or social welfare. The integration of systems will cover other government organisations in future, for example the Ministry of Commerce and the Ministry of Education. Throughout the integrated system, the Ministry of Commerce, for instance, will provide the MOLSA with information about people running businesses or holding commercial licences, and those people not qualified by Ministerial rule to have any kind of social welfare and services.

Such a project, the director of technical services reported, will restructure the IT infrastructure of the organisation. His perspective was to reform the IT infrastructure in the organisation to provide more reliable and effective services to citizens through the e-government portal and speed up the decision-making process. As a consequence, this project will enable a full network of ICT systems and provide all relevant data to all points in the organisation when needed. This requires that all parties involved in the MOLSA are computerised and interoperable. Naturally, security control protocols need to be established to ensure that the right data are available to the right people at the right time. For instance, standards are required around who should have access to portable electronic unemployment records.

When interviewees were asked to assess this project (i.e. connecting local database systems through the use of a centralised database), they indicated that the interoperability between systems as a result of such projects will improve and accelerate progress of e-government projects, in particular the organisational portal. However, the strong relationship, trust and cooperation between top management and IT department are also vital for the continued success of e-government projects, especially in a large organisation like the MOLSA. Many

staff and also citizens encounter cross-departmental boundaries, which suggests culture barriers to information sharing and collaboration need to be traversed. To address such barriers, considerable effort by the parties involved is required, and this often begins with senior management. This is an indication of the influence of culture barriers and the role of senior managers in the process of implementation, and the next section will elaborate on different barriers experienced in the organisation.

The e-government project team considered the data warehouse project as part of their e-government strategy. It plays a significant role in integrating government organisations, as discussed in Chapter 2 and illustrated in Figure 2.3. Data warehouse is a type of informational database architecture designed to organise disparate data sources into a single repository of information, that when combined into a formal structure offers more information and statistical figures to the user than the separate individual data elements. The IT manager justified the need for the data warehouse project to increase the effectiveness of the decision-making process through facilitating a new type of decision intelligence by providing quality information and access to historical data trends. The project will also improve government accountability and analyse the efficiency of countrywide spending. The proposal for the data warehouse project was made in 2003, and the process of building started in early 2004 to support the department of social services within the organisation. The project will also potentially help several organisations within the government, enabling them to join together to collectively plan and implement the system. Since the initial collaboration, 15 organisations have agreed to participate or provide data sources. However, the CIO seems reluctant to participate and provide its data sources, such as citizens' CPR ID, address, occupation, etc. which creates a barrier to the implementation of this project, as will be discussed in a later section.

The development process of the data warehouse project is based on iterations beginning by addressing core issues, then expanding outwards. The process was begun by planning the data warehouse architecture. This included choosing the implementation team, initiating strategy, writing documentation and collecting inputs. The implementation team is now in the phase of identifying the available internal data within the MOLSA sections and also determining relevant input data from other government organisations. The process was then extended to

sending a formal request to predefined organisations to provide their input data. Currently, the design process is in place to create database tables and apply normalisation. Constructing and determining the entire database tables and identifying the methodology of query process, reports published, records management, and data models are ongoing. Although this process does not require vendor involvement, in the next implementation phase the IT department will call for tenders to choose the appropriate IT vendor to provide essential hardware and software. The project is expected to be completed in late 2005, as illustrated in Figure 5.3, with limited access to the public until incorporating the necessary security tools, although there is a trend to expand in the future to allow public access to selected databases within the data warehouse.

Since ESB is a web-enabled system and developed by somewhat contemporary software, Oracle 8i, then the e-government project team is in their development phase for connecting this system to the front-end application of the organisation's website, which is considered a very important step towards posting interactive e-government services. There are two reasons for this project: first, to reduce the queues of services applicants that exist every day in the organisation, especially in the Department of Employment Services, by allowing them to access the organisation's portal to keep track of the status of their application for employment. Second, this project will also allocate an electronic application form through the e-government portal that can be used by job searchers and enable them to fill in the form online, upload it back, and then process it through the employment information systems, ESB. Although this project seems straightforward to some e-government team members, the director of technical services expressed a different perspective. He reported that there are some barriers that could restrict and then delay the implementation of this project, such as security issues and funding. He emphasised that the MOLSA would not link any of its database systems to its website until it was sure about the security of the systems and privacy of applicants' data by equipping the MOLSA's portal with essential security tools and technologies. He also stated that the available budget for 2004 might not be sufficient to complete the project during this year. This indicates the role that barriers can play in preventing the progress of e-government projects.

Interviewees were then asked to identify the key elements that necessitate supporting the implementation process of e-government projects in the MOLSA. Their answers are summarised below:

- Updating incompatible systems, particularly databases and systems used for financial and administrative transactions, social services, training and labour management.
- Addressing problems associated with reengineering business processes and shifting from competition to coordination, including dealing with the many overlapping services and databases, data collection inconsistencies, and lack of information coordination and sharing across the organisation
- Incorporating security and privacy tools and technologies that can be used for secure ICT infrastructure, including protecting portal and privacy of personal data, which is transmitted and stored across systems.
- Dealing with complex organisational, planning and policy issues such as active and direct contribution of top management to reduce resistance to e-government projects and allocation of sufficient financial resources, creation of a coherent and functional institutional basis for the development of ICT policy and ICT coordination between the CIO and MOLSA, and consolidation of the information strategy.

5.6.5 MOLSA's E-government Benefits

Analysis of the empirical data shows that the benefits were considered one of the factors affecting the decision making of top management towards the adoption of e-government. The reason for this is that the organisation's management evaluates the benefits of any IT projects, including those relating to e-government, before taking a decision to allocate a budget or accede to a request for an additional budget from government. For example, the undersecretary, with some other organisations' senior officials, used to hold regular meetings with the director of technical services and IT managers to discuss projects' implementation, progress reports, and any IT-related issues. Many e-government projects (e.g. data warehouse, integration) that need a budget or approval from top management would be discussed in this meeting and common questions asked were: What are the benefits returned to the organisation from implementing such a project? What is the approximate budget needed for such a project?

According to interviewees, answers would be prepared before the meeting if they wanted to present any proposed IT project which needed approval or financial resources.

The benefits reported in this section reflect benefits derived from the implementation of e-government at Stage 1, and also from implementation of recent e-government projects that meet the functionalities associated with Stage 2. Also reported are benefits that will be derived from other IT projects in progress which are considered key components to build the architecture framework for e-government, as shown in Figure 2.3.

Interviewees, generally, shared similar perceptions, and agreed that the emergence of the e-government project had identified the weak points in their IT infrastructure, especially with regard to security and privacy issues. The e-government project had allowed them to redevelop the ICT infrastructure and provide new solutions to address many existing technical and organisational problems. Moreover, the e-government project would gradually reduce the cost of performing transactions within the organisation in the long term, despite the dramatic increase in the number of applicants and employees' additional hours.

One anticipated benefit emphasised by interviewees was the enhanced performance of organisational outcomes through integrating systems and automating business processes and procedures. This would lead to the provision of consistent output to citizens and also improve the decision-making processes among the organisation's departments.

Organisational, operational, technical and external benefits of e-government adoption in the MOLSA are analysed and then classified according to their level of importance in Table 5.9.

Category	E-government Benefits	Level of Importance
Organisational	Improve internal management and support decision-making process	●
	Increase productivity of government organisations	●
	Allow organisation to do business more effectively	●
	More organised and effective business process	◐
	Reduce layers and complexity within organisational processes	●
	Reduce workload of organisation's employees	◐
	Improve quality and efficiency of data and services	●
Operational	Increase understanding of government rules and policies	◐
	Improve accountability and transparency of government transactions	◐
	Reduce amount of time spent on government services delivery	●
	Reduce communications costs between organisations	◐
	Reduce maintenance cost of ICT tools and applications	○
	Develop new skills and motivations for government employees	○
Technical	Improve connection within and between organisations	●
	Enhance government ICT infrastructure	●
	Provide portability between systems and applications	●
	Improve and control the security of infrastructure and privacy of data	●
	Achieve process and data integration	●
	Increase the reliability, consistency and accuracy of data sharing	●
	Reduce redundancy of data, applications and infrastructure	●
External	Digitising procurement services from and to business sector	○
	Increase collaboration with private sector	◐
	Quick processing and response to citizens' needs and expectations	●
	Provide new services to citizens and business	●
	Increase collaboration among public sector organisations	○
	Enhanced availability of organisation information and its access to citizens	●

Table 5.9: Classification of MOLSA's E-government Benefits

5.6.6 MOLSA's E-government Barriers

The MOLSA has experienced several barriers during the step towards Stage 2 of e-government implementation. The MOLSA pointed out a lack of involvement from the CIO in e-government development projects, and highlighted the need for practical frameworks to implement necessary organisational and technical changes. The various organisational,

technical and political factors that have made relations with other organisations difficult are discussed below.

The MOLSA faced a cultural problem with the CIO when the IT team reached the design phase of the data warehouse project. In this phase, the design of database tables is critical and necessitates integrating disparate data from different departments of government organisations. As discussed in Section 5.5.3, the CIO is hosting and running a CPR database system which contains primary data about citizens in the country. The CIO's management was unwilling to provide the IT department in the MOLSA with necessary CPR data to accomplish the data warehouse project. Interviewees expressed disappointment with the unsatisfactory collaboration from the CIO, notably its failure to help the MOLSA meet technical requirements and complete the project. It had delayed the process for approving budget allocation and had not provided the appropriate electronic connection through the GDN. According to interviewees, the CIO's lack of collaboration was possibly due to its reluctance to support other government organisations housing their data in the MOLSA's systems, since this might result in the reduction of the CIO's power and authority.

The MOLSA sometimes needs to contact the Ministry of the Interior in order to obtain data about certain applicants for verification purposes, since it deals with people from various sectors. However, this procedure could delay internal operations to provide social services to applicants. Since the Ministry of the Interior deals with matters of defence and homeland security, certain formal channels and protocols need to be used before authorisation is given for data to be provided to other government organisations. Moreover, unlike most other government organisations, this Ministry does not share its data via electronic connections with other government organisations through the GDN, which means the MOLSA has to make personal contact with it. Therefore, transactions with this organisation take a long time, at least 10 working days, which reduces the quality of services provided by the MOLSA and makes provision of such services through the e-government portal complicated.

As discussed in previous sections, top management's commitment to the adoption of e-government projects is not as dynamic as MOLSA staff expected, since the former has repeatedly failed to acquire additional financial resources to support e-government projects

from government. As a result, most projects' implementations have been affected by the shortage of financial support, since some of them are critical for the organisation's workflow. For example, the project to link ESB applications with the organisation's portal may be discontinued because of insufficient financial resources to install the necessary IT tools and security technologies.

security and privacy issue is another barrier that restricts the MOLSA's progress towards the implementation of Stage 2. The director of technical services pointed out many times that they would not put their systems at risk by linking them to the e-government portal without installing and running appropriate security tools to protect their systems and applications. They had already had one bad experience when one of their systems had been hacked and some sensitive data had been lost. The director was also concerned about the privacy of citizens, especially those with sensitive data regarding their income level, health condition, and social status.

Viruses are another internal threat, since many organisations' employees do not take note of security rules and virus alerts issued by the IT department and the CIO. Interviewees had the same perception towards security concerns but thought they could carry on developing the organisational portal with minimum security requirements.

Although the MOLSA has taken several important steps towards reforming its ICT infrastructure through adopting new IT projects or by developing existing information systems, progress is still slow, and the organisation is still struggling with network capacity and the complexity of the communication infrastructure (see Figure 2.3 for Infrastructure layer components) which is an important foundation for integrating information systems across the organisation. The Director of Technical Services and the IT manager both agreed that lack of a sophisticated technical infrastructure is a significant barrier to developing the government capability to provide online services and transactions. They shared the same perception as IT developers and the database administrator that the integration of various IT applications and components inside and outside the organisational boundary remains costly and time-consuming, due to the heterogeneity of the computing environments in the organisation's departments, sections, and remote social centres. These problems were compounded by the Civil Service Bureau's complex recruitment process and low salaries offered to IT staff.

As a result, there was a shortage of IT staff skilled in Oracle database design and development, network and communication engineering, and Internet applications' development. It has been noticed also that the business processes' reengineering and organisation restructuring are not a concern for the MOLSA and do not cost too much when compared to hardware, software and development.

The barriers of e-government adoption in the MOLSA are analysed and classified according to category and level of importance in Table 5.10.

Category	E-government Barriers	Level of Importance
Organisational	Unclear vision and management strategy towards e-government	○
	Lack of coordination and cooperation between departments	○
	Lack of effective leadership support and commitment amongst senior public officials	○
	Complexity of existing business and management processes	●
	Absence of business rules and documentations	●
	Cultural issues	●
	Resistance to change	●
	Insufficient time and amount of work required to maintain e-government projects	●
	Political issues	●
	Resistance to sharing information and knowledge	●
IT infrastructure	Shortage of reliable networks and communication	○
	Inadequate network capacity or bandwidth	●
	Existing systems incompatible and complex	●
	Lack technical standards and common architecture policies, specifications and definitions	○
	Lack of integration across government systems	●
	Lack of knowledge regarding e-government interoperability	○
	High complexity in understanding processes and systems in order to redesign and integrate them	○
	Lack of enterprise architecture	●
	Unavailability of e-government software, systems and applications	○
	Integration technologies of heterogeneous databases are confusing	●
Qualified Staff .	Lack of IT training programmes in organisation	○
	Shortage of well-trained IT staff in market	●
	Shortage of management skills staff	○
	Lack of employees with systems integration skills	●
	No time for training staff with new technologies	○
	Complexity of government's recruitment process	●
	Shortage of salaries and benefits in public sector	○
	Flow of IT specialist staff	○
Operational Cost	Complexity of financial supply process from the Cabinet Office	●
	Lack of financial resources in public sector organisations	●
	High cost of IT professionals and consultancies	○
	High cost of required hardware and software	●
	High Cost of installation, operation and maintenance of e-government systems	○
	High Cost of training and developing staff	○
Security and Privacy	Threats from hackers and intruders	●
	Threats from viruses, worms and Trojans	○
	Insufficient budget for security technologies and solutions	●
	High cost of security applications and solutions	○
	Unauthorised external and internal access to systems and information	●
	Lack of knowledge and vision for importance of security	○
	No assurance that transaction is legally valid	○
	Lack of security rules, policies and privacy laws	○
	Inadequate security level of organisational hardware and software infrastructure	●
	Absence of privacy of personal data	●

Table 5.10: Classification of MOLSA's E-government Barriers

5.6.7 Lessons Learned from MOLSA's Case Study

- One of the most significant challenges face the MOLSA is unqualified IT infrastructure. For example, heterogeneity of the computing environment in the organisation sections, lack of security tools to protect IT systems, insufficient capacity of network and communication infrastructure, and incompatible and complexity of existing systems. The MOLSA need to modernise its IT infrastructure, at all level, to successfully undertake e-government implementation and progress towards address the requirements of Stage 2.
- The MOLSA characterised by complex structure, hierarchal nature, large volume of data to manage, cross-departmental boundaries, and staff development is unlimited. These characteristics make the MOLSA, as large firm, less flexible to environmental changes. The adoption of e-government would be useful step in the MOLSA, as impact of e-government is considered far reaching, in order to improve its operational efficiency through reengineering its business and management processes, modernise business models and rules, and increased the collaboration between sections.
- The commitment and support of top management for the implementation of e-government related projects was not strong enough. As well, no evident for direct participation from senior managers into the process of implementing e-government projects. Throughout the process of e-government adoption, commitment, support, awareness, and participation of top management are vital to allocate sufficient budget from Cabinet Office, reduce resistance, solve unexpected problems, remove political barriers, and support necessary business and management changes.
- Stakeholders' views and suggestions should be considered during the implementation of e-government projects.
- The number of IT staff in the MOLSA compared to its size, volume of data managed, and daily services provided to citizens is very small and considered insufficient to achieve any IT projects according to the specified timeline.
- The MOLSA management should concern about the social issues in the organisation, and hence shift the culture context from competition to coordination among different business sections.
- Organisational and IT infrastructure were the most frequent barriers during the analysis of empirical data. However, other barriers like shortage of IT staff and operational cost were restricted also the organisation to make further progress. The MOLSA should overcome these barriers if it wants to make good progress and remain competitive in government.

5.7 Case Study Three

Organisation	Level of Interaction	E-government Maturity Level
Ministry of Commerce	Government-to-Business	Stage 3

The Ministry of Commerce (MOC) is one of the developing government organisations in the Kingdom of Bahrain. It realises the significant role of ICT in modernising its business processes. It is responsible for the registration and supervision of business sector in Bahrain.

5.7.1 Context of MOC

The MOC is viewed as one of the most active government organisations in Bahrain. The reason for this is that it provides services, information and transactions to the private sector which includes organisations running business and commercial projects around the country. It is mainly responsible for a diverse range of activities that make up the commercial environment in Bahrain, including the registration of all forms of commercial business, commercial agencies, industrial property, standards and metrology, and foreign trade, as well as a number of other related activities. In addition, the Ministry's aim is to ensure the maintenance of an open, transparent and market-driven commercial environment so as to develop Bahrain's economic competitiveness, and to encourage inward investment, at the same time promoting employment for the local population.

The structure of the MOC consists of 9 directorates, each of which includes a number of sections. Each directorate reports to the Assistant Undersecretary who, in turn, reports to the Undersecretary. The structure of the organisation is relatively small and has recently been reformed by establishing a new directorate called the Electronic Commerce directorate and appointing a new director and MIS-related staff. The main objective for this directorate is to encourage the development of the private sector in utilising e-commerce business trends through targeted programmes and consultancy services, and also to develop the strategic infrastructure of e-government to deliver channels that provide a variety of service options to MOC customers, such as online registration, review and update customer profile, and apply for a new business project.

The recent organisational reform and appointments made by the Minister give a clear signal of ongoing support for the MOC portal (www.commerce.gov.bh). The Electronic Commerce directorate was established in late 2003 and consists of 3 sections. An IT and e-government advisor to the Ministry was appointed in late 2003, and reports directly to the Minister. Five staff were subsequently appointed to work under the e-commerce directorate. These appointments were made to ensure the organisational goal of e-commerce would be achieved. In the same year, a director of e-commerce was appointed to oversee the implementation of e-government strategy, and to facilitate the organisation's electronic interaction with the private sector. The creation of a new directorate and positions was a clear signal from the Minister that the Internet was to be used as the public's primary point of access to the MOC. It also signalled that the organisation is realising the role of ICT, especially the Internet, in the new economy and promotion of investment.

An interview with the Minister of the MOC revealed that he was motivated towards the adoption of e-government to modernise the business structure, processes and operations of the MOC. This interview provided an evident that the commitment and support from the Minister towards the adoption of e-government projects was active. It also shows that competition behaviour was existence in the organisation. The Minister commented as follows:

“We want to change the role we play with our partners over the coming four years and differentiate our Ministry from the other Ministries. We need to be flexible enough to respond to market opportunities, while developing a minimum level of consistency with the major external forces. This requires us to be effective in the sharing of knowledge and resources across our Ministry and to build critical common information systems platforms to support our large and growing business. For this we need to have the right skills and effectively link our people to our training and other skill development programmes”
(Interviewed by the researcher May, 2004).

5.7.2 MOC's Strategic Plan

The MOC established its electronic service delivery programme as part of the MOC's strategic plan in 1999. Overall responsibility for the programme rests with the committee chaired by the

Assistant Undersecretary of Domestic Trade. The chairman essentially has two teams concerned with e-government and e-commerce issues which report to him: the organisation's business process team which manages the necessary changes and design for the organisation's management operations, and a technical team that is responsible for developing ICT infrastructure within the organisation. The project teams works alongside strategic partners, such as Microsoft, TCGME, and IBM.

In 2001, the organisation revised its strategy and outlined the general features of its strategic plan as follows:

- To promote and foster the take-up of e-commerce as a business driver in Bahrain to support business competitiveness, and as a growth sector in its own right.
- To provide a relevant, market-driven commercial infrastructure based on a suite of laws and regulations, which supports Bahrain's legitimacy as a home for business, and which provides balanced protection for both investors and consumers.
- To provide an efficient, fast and cost-effective incorporation service.
- To create a legal infrastructure that is conducive to fair competition and in accordance with the market economy principles.
- To promote and foster the take up of ISO registration amongst Bahraini companies with a view to enhancing their international competitiveness.

In 2003, the MOC again revised its e-government strategy to be compatible with the new government agenda in keeping with the fundamental features described above. The new strategy was initiated to take into account the following factors:

- Political reforms in Bahrain
- Incredible changes in technology
- New issues of globalisation
- Regional economic challenges and opportunities
- Demand of citizens and the business community for provision for better businesses' and effective services

The overall MOC strategy has six cornerstones (Business process, ICT, Staff development, Services quality, Consumer protection, and International organisations) that underlie organisation's new direction for e-government to ensure comprehensiveness and coverage of all MOC business units. Description and characteristics of these cornerstones are classified in Table 5.11.

Cornerstone	Description	Characteristics
Business Process	MOC needs to reorient its services from transactional to relationship marketing where the customer is at centre of all business activity within organisation.	<ul style="list-style-type: none"> • Change practices and procedures that facilitate the delivery of services. • Change the business model, based on more detailed understanding of customers. • Senior management should support transition and personally demonstrate customer-focused behaviour.
ICT	Technology provides MOC with supportive environment to enhance management performance and facilitate automation of business processes.	<ul style="list-style-type: none"> • ICT forms backbone of MOC's service offerings. • ICT is dominant force enabling MOC to exploit new distribution channels.
Staff Development	Provide commitment to people development and better people management by building framework that supports the MOC's vision and demonstrate how MOC people are intrinsically linked to successful MOC business model.	<ul style="list-style-type: none"> • Create environment that attracts and energises best people. • Infuse organisational culture with trust, respect, integrity and appreciation.
Services Quality	It is mandated that quality of services offered by MOC should exceed customers' expectations.	<ul style="list-style-type: none"> • Services' and products' scope should be considered beyond MOC's internal affairs. • Quality of services' provision and standardisation of products must be maintained.
Consumer Protection	MOC needs to commit to secure appropriate consumer protection by realising and improving existing consumer protection legislation such as unfair, deceptive, or fraudulent practices.	<ul style="list-style-type: none"> • Provide adequate safety for consumers taking into account all required security technologies. • Ensure that consumers receive adequate and appropriate information to make informed decisions about products and services. • Ensure there is appropriate balance between consumers' goals and business goals.
International Organisations	Working on serving and enhancing relationships with both regional and international organisations.	<ul style="list-style-type: none"> • Develop and maintain cooperative relationships with both regional and international trade organisations to facilitate trade and investments. • Adopt pragmatic approach towards future international policy decisions and implementation of existing ones.

Table 5.11: Classification of MOC's Strategic Cornerstones

Forming a critical part of the MOC's (2003) strategy, key points of its e-government strategy are set out, among which ICT is viewed as an enabler for organisational change focused around the re-design of the delivery of services and information to stakeholders - customers, suppliers, partners and employees. The key points of this part of the strategy are summarised in the following points:

- Transformation of the organisation's staff around a focus on the customer and a philosophy based on customer relationship management (CRM) through the use of electronic tools.
- The development of a number of electronic channels for different customer groups, with clear incentives to encourage use of such channels. As part of this strategy, the organisation intends to offer improved e-services to the business sector, thus reducing the burden of compliance on individuals and organisations.
- Greater integration of its services with that of other departments and the provision of its services extended through commercial and government organisations' portals

Accordingly, the MOC has initiated a number of IT projects as part of its e-government strategy which will address the key points described above. The implementation of these projects will lead the MOC to becoming an electronic Ministry and delivering 80% capability for Electronic Service Delivery (ESD) by 2006 through establishing a comprehensive MOC-wide electronic environment. Table 5.12 demonstrates these targets with their project plans (Further details of these projects will be presented in Section 5.7.5).

MOC Project Plan	Start	End approx.
Meet or exceed 95% of IT systems' availability by utilising advanced technology and machinery for all MOC business sectors	Mid-1999	Late 2004
Introduce MOC-wide electronic document management system	Late 2003	Mid- 2004
Establish MOC-wide intranet utilising advanced technology	Late 2002	Late 2004
Introduce knowledge repository and intelligent systems to improve MOC knowledge management	Mid-2003	Mid-2005

Table 5.12: Description of MOC's E-government Projects

5.7.3 IT infrastructure

From the previous section, it is apparent that the MOC has attempted to position itself at the forefront of e-government in the Kingdom of Bahrain. The organisation is attempting to transform its performance using ICT. This is evident in much of the strategic thinking emanating from top management within the organisation. However, the existing setting of ICT infrastructure within the organisation seems to be less sophisticated in addressing all the requirements of e-government projects mentioned previously. Therefore, the organisation's management has attempted to overcome IT infrastructure shortage of essential e-government applications and tools by outsourcing and establishing IT partnerships with local and international vendors. The IT manager indicated there is active commitment from top management to provide required IT tools to support the e-government portal and develop the existing network and communications infrastructure. The organisation has every intention to maintain the e-government project, including portal management, entirely in-house.

Like other government organisations, the MOC's main information system, which is responsible for commercial registration and management (CR), is hosted and maintained by the CIO (see Table 5.5). As explained in Section 5.5.3, the CR system is web-enabled, which facilitates connection with portal front-end applications. The organisation is equipped with the LAN that covers all geographical parts of the organisation which communicates with each other through the organisation's application servers. The LAN is connected to the GDN architecture through CISCO and 3COM integrated switches, using the MQ series as the application integration technology. This connection allows the MOC to contact other government application servers and also access Internet domain servers. The IT department is satisfied with the current GDN bandwidth and connection speed provided from the CIO, since the latter is using sophisticated transmission media such as Infrared and MPLS.

The existing IT infrastructure within the organisation includes a combination of hardware and software with multiples of application servers that facilitate Internet-related business. Table 5.13 shows the major components of IT infrastructure within the organisation and their role in the MOC's business operations.

Information System	Description	Technical Characteristics
Commercial Registration System	Registers and manages all types of commercial licences issued by the MOC. Also stores and manipulates commercial property records around Bahrain.	<ul style="list-style-type: none"> • Web-based application • Database management system • Online linked to front-end applications of MOC portal • Connected to many government and private organisations through MQ series • Written in Oracle
Intellectual Property System (IPS)	Manages and assigns property copyright, Trademarks, Patents, Industrial design and other IPR-related systems. Develops procedural and logistical issues concerning inspection of IPR field in kingdom	<ul style="list-style-type: none"> • Web-enabled • Connect to portal soon • Database system • Written in Access and SQL
Information and Document Sharing Application (Share Point)	Helps organisation's employees share information, collaborate on documents, and collect employees' knowledge among MOC business units through Internet or LAN	<ul style="list-style-type: none"> • Web-based application • Document management system • Linked to organisation's portal • Based on SQL Server 2000 Enterprise Edition • Microsoft product
Interactive Voice Response (IVR)	Automatic Call system that provides 24 hours hotline transaction processing. Deals with most customers' inquiries and services, such as CR inquiries, renewal of CR, complaints, and customers' requests for forms and fax	<ul style="list-style-type: none"> • Computer telephony software • Call Centre system operations connected with CPR and CR information systems. • IVR System incorporates full-featured, integrated Fax and e-mail • Incorporates Windows NT/2000 as platform operating system
Private Box Exchange (PBX)	Phone system that utilises Ethernet phones to communicate with desktop - converging both voice and data across MOC through LAN	<ul style="list-style-type: none"> • Telephone software-based solution • Integrated with exchange server to convert call into e-mail • Connected with share point server through the LAN
Exchange Server	Mail server that can manage and assign e-mail accounts for employees. Facilitates collaboration among employees, include maintaining shared address lists, scheduling meetings and sharing other types of information, either in public folders or by granting access to folders.	<ul style="list-style-type: none"> • Assigned 345 e-mail accounts for each employee • Based on Microsoft solution • Handles POP, IMAP, and web clients • Integrated with PBX server
Web and Domain Server	Manipulates and controls organisation's portal contents	<ul style="list-style-type: none"> • Sun Java system • Based on Java Servlets and JSP technologies

Table 5.13: Description of MOC Information Systems

As Table 5.13 shows, back-end ICT systems within the organisation are converging on Internet and web-based standards. Table 5.13 reports that the major applications, such as IPS and share point are connecting to the front-end applications of the MOC portal, hence it will be useful not only for the clients but also for the organisation employees which addresses the requirements of G-to-B aspect (see Chapter 2). Since increasing the use of such technologies, major investment is currently being undertaken by the organisation to automate the business process and increase the level of interactivity on its portal. The organisation recognises the need to develop an infrastructure capable of supporting integration between front-end and back-end applications to achieve a fully transactional portal. For example, one of the major IT infrastructures requirements is to increase the capability of existing Knowledge Management (KM) solution (see Share Point in Table 5.13). This essential project, as part of e-government strategy, will enable the MOC to progress towards an integrated government portal vision, as described and met the e-government architecture proposed in Chapter 2, Section 2.3. The MOC started the first phase of designing and developing the KM project in January 2003 and the IT team expects to complete the project by December 2005, as shown in Table 5.12. The first phase of the project identified the requirements and problems as part of the design process and system modulation. The project team during the case study was designing architecture able to fulfil the organisation's requirements and integrate with existing systems. However, the IT team was struggling with this project due to shortage of IT staff and the amount of time required to achieve such a project. To address these problems, the IT manager indicated that local vendor's help would be sought during the development and implementation phase to provide a possible solution. The KM solution will be integrated with the organisation's IT infrastructure and front-end application for the MOC portal.

In coordination with the World Intellectual Property Organisation (WIPO), the IT development team is cooperating with WIPO IT staff to redevelop the Directorate of Industrial Property back-end systems to provide standardised communication between the MOC system and WIPO system. This will allow consistent integration of both data and processes between the core information systems, such as CR and IPS and WIPO IPS. The reason for this project is to ensure that laws and the registration of intellectual property in Bahrain are compatible with WIPO regulations and standards.

Electronic government is clearly central to the MOC vision. As an example of this commitment, the organisation has made a major investment in its portal (www.commerce.gov.bh) for which the organisation won an award in 2003 and 2004. The security and privacy issue was one of the challenges facing the organisation. It realised that online interaction exposes citizens to unique threats to data privacy and security of their information, which makes them less convinced about the safety of accessing government sites, and decreases their trust in the MOC e-government portal. Therefore, from the interview with the e-commerce director and analysis of the MOC portal, the organisation enhanced the portal security tools and security architecture of the existing ICT infrastructure by carrying out quality security audits and procedures conforming to international and best practice security and quality assurance standards. The organisation is using advanced security tools that protect its portal contents and preserve the confidentiality of its customer information by using Firewall, Anonymous Proxy Servers, Verisign SSL certificates, and the 128-bit active encryption technique for encrypting data exchange. As a second phase towards developing security architecture, PKI and presentment technologies are considered to be cornerstone projects in the MOLSA's security architecture to strengthen the security of the online-transaction process between the MOC and businesses. These projects are expected to be completed by the end of 2005.

Duplication has been observed in some hardware and software used by the MOC and CIO. For example, the Microsoft Exchange Server that is hosted in the CIO to provide e-mail accounts for government employees is also hosted in the MOC for the same purpose. Interviewees suggested that duplication is due to a lack of coordination between the CIO and MOC, and the absence of a central organisation coordinating the e-government implementation process among government organisations. As a consequence, government organisations have adopted their own systems and tools which might lead to resources duplication and sometimes conflict with other organisations.

5.7.4 Organisation Behaviour towards E-government

The process of organisational restructuring, which started in February 2003, was identified by management as critical in achieving better collaboration across departments and creating an

environment that will support the introduction of new e-government applications (e.g. share point, DMS, KM). The restructuring began with collecting information from all MOC business units covering business rules, business processes and service operation, and then analysing and studying these business processes and service operations for re-engineering. Re-engineering of the process started with process automation for Foreign Trade, Gem Stones, and ended with Consumer Protection and Standardisation. Interviewees were hesitant about revealing what had transpired as it resulted in organisational restructuring; however, the researcher was able to identify one important outcome. The director of the e-commerce directorate had been delegated additional authorities, such as authorising commercial licence applications and dealing with complex complaints. The restructuring had given MOC management greater decision-making abilities and facilitated the creation of more productive working relationships among departments. The restructuring had also resulted in more effective and coordinated information and services' provision to businesses and citizens.

According to interviewees, MOC staff members had responded positively to an increase in cooperation between departments. For example, the Document Management system (DMS) and Share Point software (see Table 5.13) play an important role in this cooperation which represents an active application of G-to-B interaction level. Official documents and working papers are delivered electronically to staff members, and any formal letters, faxes, memorandums and orders can be exchanged electronically between departments' staff through their e-mail or DMS. This has decreased the time spent in processing certain transactions and increased the productivity and efficiency of departments.

The E-commerce director believed that the use of ICT was central to the development of better service provision. He pointed out that the networking infrastructure is important to connect the disparate locations of the MOC to a centralised repository, and the ability to access the Internet is important for staff to access information and communication technologies. Further, he believed that access to electronic working papers and formal documents would increase the convenience and efficiency of providing services, and would also facilitate collaboration with other governmental organisations.

It was apparent from the case study investigation that there was an internal political desire to adopt e-government. The Minister of the MOC emphasised his support of efforts to implement e-government projects, and the undersecretary indicated that he was motivated to add more

interactive e-services to the organisation's portal. Top management's motivation to advance e-government strategy was reflected in their support of projects offering performance gains across organisational boundaries, such as e-procurement, e-services, e-regulations, and e-signatures.

Interviewees agreed there is formal commitment and support from top management, as indicated by the following:

- The Minister heads a steering committee called the development committee that is responsible for reviewing the progress of projects and solving any further problems or complexities.
- Some departments had reported the problem that their employees presented resistance because they lacked the skills needed to use computers and systems. This problem had been solved by senior managers' intervention, and providing them with the necessary training.
- Most memorandums and orders issued from top management are sent electronically through website server or e-mail, thus management's use of the computer system sets an example for others to follow, and shows its support of it.
- The senior managers in the MOC are well educated, most have higher degrees in business functions and MIS, and hence understand the role of IT and e-government in developing the MOC's business process performance.
- Lack of financial resources was not stated by interviewees as a significant constraint on e-government project implementation, since top management dedicate a somewhat sufficient budget to ICT projects.
- Seniors managers often send strong signals about the importance of e-government projects to other stakeholders within the government organisation to involve them in the project process, build support, and minimise resistance.

Staff members' responsiveness to change in some processes of their departments' business operations as a result of the implementation of e-government projects had generally been positive. According to interviews with the business process team, because top management recognised there was a potential for resistance to change, it had focused on eliciting stakeholders' opinions in the development of strategy and the implementation process.

Regular meetings, presentations, and workshops had been held, to which stakeholders among the organisation's departments had been invited. Guidelines, instructions and leaflets were also distributed to staff members describing the benefits of electronic services, and clarifying the process or procedures of a particular new system. However, there was some reluctance to change on the part of older employees in the initial years of IT usage. They could not see the need for the organisational changes taking place in the quality improvement drive. Their actual number was never counted. However, according to the e-commerce director, they were in the minority, and their resistance level eventually decreased as employee participation in the changes increased.

In addition to promoting internal acceptance of the new business processes, the organisation had established a new section called 'marketing', under the e-commerce directorate's supervision. The main purpose of this section is to monitor the acceptance rate of e-government services and online strategy among the MOC's clients, both businesses and citizens. This section was activated in 2003 to increase the awareness of citizens who run commercial enterprises for the benefits of using the organisation's portal. Such benefits include register a new commercial licence electronically, renew a licence, update the profile of clients business, check clients application status, cancel a commercial permit, or access other relevant services. In addition to providing leaflets and brochures to clients describing the benefit of using the e-government portal, the head of the marketing has dedicated 3 PCs connected to the Internet and placed them in front of the main gate of the organisation in order to encourage incoming clients to perform their transactions through the organisation's portal by giving them small presentations on how to use the portal, and showing how easy is to process their transaction through the MOC portal. According to the head of the marketing, this has encouraged many clients to perform their applications and transactions through the portal, without attending in personal at the organisation. As a result, the queues and rush in the organisation's business units have been noticeably reduced.

The MOC's structure is relatively less complex when compared with that of other government organisations, such as the MOLSA, CIO and Education Ministry. The volume of services and transactions provided to the public, volume of information processing, and numbers of employees are also relatively moderate. As regards the case study, it was noted that the

MOC's size, which is comparatively small, has played a major role in enabling it to achieve a mature level in e-government implementation (Stage 3). The flexibility structure of the organisation and the fewer levels of bureaucracy have helped to speed up the restructuring process of the organisation, its business operations and practices. This indicates that organisational size is an influential factor in the implementation process of e-government.

Although the MOC is considered one of the best practice examples of the implementation of e-government projects, not only in Bahrain but in the Arab World as a whole, on account of its successfully implementing most the requirements of Stage 3, and providing a well-planned strategic framework for automating its business process, it was noted that no formal or informal assessment procedures had been implemented to evaluate the e-government project within the organisation and measure the success level of the online strategy.

5.7.5 E-government Implementation Process

In 1998, the MOC published the first strategy framework, pointing out the significance of e-government projects (it was called e-commerce) in its daily business process and practice. This framework was intended to facilitate the establishment of cross-organisation collaboration and to enable people to interact online with the organisation's website, without needing to understand how the MOC was structured. The framework was initially proposed to establish the MOC website and inform people about the nature of the organisation and the services provided. Throughout this year, management was dedicated a budget to reform the IT infrastructure and develop its information systems into web-enabled applications. In 2000, a new website was launched to provide general information about the MOC, services provided, organisational and governmental news, and links to other relevant organisations (Stage 1). The website functionalities were enhanced in 2001 when the organisation's databases and applications went online by connecting them onto the website. In 2002, a client was able to download a service application form and also access his/her commercial registry record to retrieve, check or update information on the record. This was a result of connecting back-end systems, such as the CR system, to the front-end applications of the MOC portal (Stage 2). In late 2002, the organisation's management invested in developing the organisation's portal by incorporating new IT tools, such as Share Point, DMS, ODBC, Exchange server, e-business

tools, payment engines, etc. (see Table 5.13 and Figure 5.4). With regard to the improved strategy published in 2003, the MOC and IBM began working on the next phase of the integrated portal and it became one of the most advanced e-government portals in Bahrain, enabling citizens and businesses to conduct monetary and non-monetary transactions online with more than 50% of the organisation's services (Stage 3). The online services were further enhanced in 2004, and now offer more than 150 interactive services, including 20 monetary transactions equivalent to 70% of the organisation's total services, which can be accessed in one of four ways: citizen space, businesses space, MOC business partners, and MOC staff corner.

The portal now is featured as an easy-to search, free-access website designed to give the visitor a centralised place to find information and services from the MOC. It provides information and transactional government-to-citizens and government-to-business services. It offers a powerful search engine that searches every word of every organisational document and service. It also features a topical index, online transactions, links to other government organisations, options to contact the organisation directly, and other tools, such as polling services, interactive online statistics, newsletter subscription, online daily reports about new commercial registration, announcements, and updated news and events.

The existing portal is an improvement on several aspects of its previous versions. One of the biggest areas of improvement is in the main page organisation. The portal allows users to set up an account with a log-in/password to the portal. This allows users to format the page with information pertinent to them and view topical information updates. Therefore, when clients receive an e-mail notice that information of direct interest to them has been updated in their account, the value and the use of the website will increase.

The entire portal is hosted by the MOC e-commerce directorate and is administered by directorate employees in cooperation with private sector partners, Microsoft, IBM and TCGME.

The portal also has strong visibility, and has won wide recognition and diverse awards for excellence. These include:

- Microsoft Golden award certificate provided by Bill Gates
- International Conference of IT in Geneva ranked the MOC's portal as one of the five best e-government portals among 136 portals
- Web Standards Awards (WSA)
- Arabian Business Magazine appreciation certificate

At the technical level, the MOC realised in 1998 that its IT infrastructure was not suitable for implementing e-government, and many problems would arise if it was not reformed. Thus, the help from external partners was sought, who reported that incompatible systems, lack of e-business applications, communications infrastructure existed, and the security level would not allow provision of end-to-end transactions. The heterogeneity of systems had led the organisation to develop its database systems, such as CR and IPR, into web-enabled applications. Subsequently, the MOC, with local contractor partners such as IBM, Microsoft, and Oracle consultants, worked to harmonise the back-end systems with the CR and IPR database systems in order to avoid redundancy of data and improve the quality of data records. They worked also to expand the geographical area of the network traffic flow architecture to cover all business units within the organisation, and hence improve the communication infrastructure bandwidth and capacity. As discussed above, partners' support represents an influential factor that impacts on the implementation process of e-government. As interviewees reported, in order to meet the objectives of e-government strategy, the back-end systems were upgraded many times to better implement the strategy. Hence the organisation employed new IT staff and worked with other local partners to become equipped with the following essential IT tools:

- An integrated source of data containing most recent data to support the decision-making process and provide immediate data transmission to the portal applications.
- This single source consists of a diversity of data from disparate government sources. Thus, providing sophisticated integration and middleware technologies to strengthen the connection with government organisations' sources hosted in the CIO has become significantly important.
- Incorporated e-business technologies and tools that allow the organisation to run e-business within the organisation more effectively, as proposed in e-government

architecture and discussed in Chapter 2, Section 2.3, such as DMS, EAI, DSS, CRM and KMS and Exchange applications.

- An amalgamated ICT infrastructure with reliable security architecture for both systems and business processes, such as firewall, intrusions detection system, SSL architecture, electronic certificate, digital signature and encryption technology.
- An electronic records management system that will help the MOC better manage electronic records through common requirements and standards. The initiative will improve the integrity of electronic records and facilitate increased sharing of and access to records across the organisation.
- Content-publishing processing that identifies types of content published, along with volume, frequency, and timeliness requirements; and source, path, and destination for all published processes, and what triggers publishing.
- Disaster recovery systems that include backup and restore architecture to meet the business process requirements.

Accordingly, the ICT infrastructure will enhance e-government operations within the organisation. However, not all the above tools have been implemented completely in the MOC, since the development level of the infrastructure is connected with available funding coming from government. Nonetheless, the existing portal is gradually meeting the objectives of its e-government strategy, and is running in a way that is somewhat compatible with the e-government architecture framework proposed in Chapter 2. Figure 5.4 shows the major components of the MOC's portal architecture as discussed above. This Figure identifies the key requirements for implementing end-to-end transactions portal, which meets the parameters associated with Stage 3 of the proposed conceptual framework for e-government adoption (see Table 5.1).

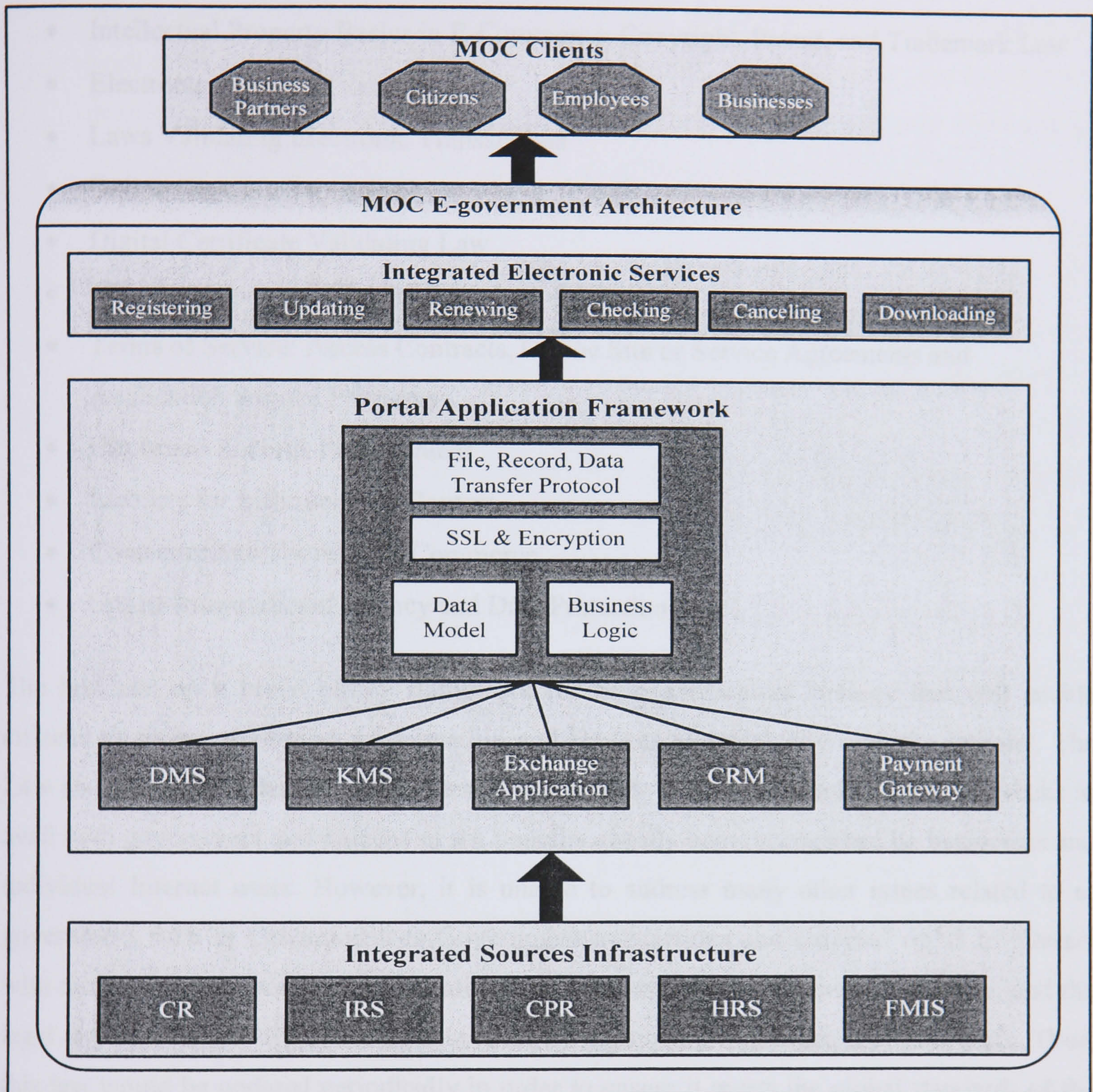


Figure 5.4: MOC's E-government Portal Architecture

At the legislative level, in 2001 the MOC started to prepare the electronic transactions law that would facilitate the use and application of electronic means for conducting transactions, and give online transactions and services between the MOC and its clients a legal base. The drafting of the law took almost 2 years between the legislative committee in the Cabinet Office and the MOC. It was finally approved by government in 2002, and then the King issued the executive order for the Electronic Transactions Law which includes:

- The Legal Landscape of Electronic Commercial Law
- Intellectual Property Basics in E-Commerce: Copyright, Patent, and Trademark Law
- Electronic Signature Validating
- Laws Validating Electronic Transactions
- Online Contract Formation
- Digital Certificate Validating Law
- Domain Names and Website Jurisdiction Issues
- Terms of Service: Access Contracts, Online Site or Service Agreements and Application Service Providers
- Electronic Records Endorsement
- Liability for Informational Content
- Consumer Law Issues in E-Commerce
- Online Informational Privacy and Data Protection Law

The law sets up a broad policy framework for an e-government strategy that will enable citizens to access government information and services electronically over the Internet. The Law also recognises the effect the Internet has already had on Bahraini society, and seeks to avail both government and citizens of the benefits already being recognised by businesses and individual Internet users. However, it is unable to address many other issues related to e-government such as Government-to-Government transactions and citizens' rights to interact with the government portal electronically. Electronic transactions are new in Bahrain, and the legal dimensions are still under development by legislators, regulators, and the courts. Thus, this law would be updated periodically in order to ensure it meets the global standards of the legislative system. The Minister of the MOC reported that there is a training plan for court judges and arbitrators to qualify them to deal with matters related to electronic processing, since they need the clearest, most comprehensive, most authoritative guidance available to respond to this complex and rapidly changing legal environment.

In interpreting the empirical data, it appears there are a number of factors which have contributed to the success of the MOC in implementing e-government projects:

- *Top management commitment:* A very important ingredient of success to reach Stage 3 of implementation has been strong organisational commitment from top management, such as the Minister, undersecretary, and the organisation's directors. Top management viewed electronic services' delivery as a high priority for organisational restructuring (see more indications of top management commitment in Section 5.7.4).
- *Clear strategic framework:* The availability of a strategic plan since 1999 and the developments of this strategy have played an important role in the fast progress of the e-government implementation process. This plan was developed according to environmental changes in the area of IT, so there is a consistency between the strategic objectives of the organisation and the process of e-government projects' implementation (see more about MOC's e-government strategic plan in Section 5.7.2).
- *Strategic partnership:* Partnership has been viewed as a key ingredient in the progress of e-government implementation. The way in which the MOC and the private sector have worked together side by side is considered efficient. Many MOC developers are from private sector consultancies such as Microsoft, Oracle and IBM, some communication specialists come from BATELCO, the telecommunications services provider, and also there is an active relationship with payment gateway providers such as BBK. In the early stages of implementation, when the MOC had insufficient in-house expertise and lacked the necessary IT tools, it outsourced some services to private sector companies.
- *Human resources:* The organisation's management initially appointed a director of e-commerce who was able to build a small team of experts. The commitment from the team coupled with ongoing planning and consultation with stakeholders is a key element sustaining the project. The involvement of staff in the implementation process, especially in initial stages with partners, is seen as an effective way for understanding the process of final deliverables.
- *Evolution of the adoption process:* The philosophy underlying the e-government adoption process in the MOC was based on 'start small and think big'. It started with

posting information and a small number of services provided by the organisation's website. Then, gradually more dynamic information and interactive services were added that were compatible with existing IT tools and infrastructure. The restructuring of the organisation and IT infrastructure led to the development of the organisation's website by adding monetary transactions and interactive electronic services.

Interviewees acknowledged that the next stage of the e-government implementation process is a strategic connection between the MOC and other government organisations which will require the transformation of business processes among government organisations. This will allow other government organisations to interact with the MOC electronically for the purpose of integrating data, services and knowledge across employees. To this end, an information management strategy committee has been established to provide leadership on the organisation's information management strategies and oversee the development of policies to support future interoperability among government organisations.

5.7.6 MOC's E-government Benefits

Interviewees agreed that one of the major benefits of e-government is the elimination of barriers between levels of the organisation and across departments. As well as the internal benefits of being efficiency-oriented, reducing the complexity of business processes is seen as a primary mechanism for improving responsiveness to clients.

However, interviewees felt little had been achieved in improving coordination among government agencies, although there was formal coordination between the MOC and the Municipality during the case study to reengineer some common business processes. For example, when a particular application for a commercial licence is approved by the MOC, the traditional process states that the applicant should contact the Municipality to provide evidence of this approval in order to obtain a permit to open a commercial structure. According to the director of e-commerce, this business procedure is now under review by the Municipality and MOC to make a decision to cancel it, since approval could be obtained by Municipality staff from the MOC's portal directly, without applicants having to contact the MOC to get a hard copy of this approval and afterwards present it to Municipality staff. This cutting of unnecessary business procedures will provide many benefits for all three parties, the

MOC, Municipality and applicant. MOC employees' workload and internal expenditure will be reduced, coordination between the MOC and Municipality will be increased, and the Municipality employees' workload and the long queues they are experiencing every day inside their corridors will be reduced, in turn increasing employees' productivity. It will also facilitate the process of investment in the country by reducing the burden on the applicant to contact multiple government sites and perform further government procedures.

Most interviewees expressed the same perceptions concerning the role of e-government projects for reducing operational cost of services' delivery, and provided examples of expenditure savings. They also indicated that cost reduction resulting from employing e-government in their organisation's operations would be more clearly recognised in the long-term as usage grows. They provided some examples of cost reductions in their daily business operations, such as integrating automated forms with DMS can deploy a single system to create, manage, deliver, review and archive forms, which allows the organisation's staff to reduce the printing, scanning, postage, stationary, administrative and telecommunication costs incurred in distributing government information. The undersecretary also reported that the number of applicants and clients had been noticeably reduced in the organisation's corridors and offices, enabling the organisation to provide more innovative services with the same available number of employees, instead of having to recruit additional unnecessary employees. He also expressed his appreciation that the e-government portal enables government transactions to be paid with credit cards, so recognition of funds into state bank accounts is faster, and eliminates regular financial accounting errors.

Another anticipated benefit frequently reported by interviewees is the increased performance of organisational productions. Integrating systems into one single source and automating business processes and practices will provide reliable output to clients and also employees, as well as improve the decision-making processes among the organisation's departments.

The benefits of e-government adoption in the MOC are analysed and classified according to category and level of importance in Table 5.14.

Category	E-government Benefits	Level of Importance
Organisational	Improve internal management and support decision-making process	●
	Increase productivity of government organisations	●
	Allow organisation to do business more effectively	●
	More organised and effective business process	◐
	Reduce layers and complexity within organisational processes	●
	Reduce workload of organisation's employees	●
	Improve quality and efficiency of data and services	●
Operational	Increase understanding of government rules and policies	◐
	Improve accountability and transparency of government transactions	●
	Reduce amount of time spent on government services delivery	●
	Reduce communications costs between organisations	●
	Reduce maintenance cost of ICT tools and applications	○
	Develop new skills and motivations for government employees	◐
Technical	Improve connection within and between organisations	●
	Enhance government ICT infrastructure	●
	Provide portability between systems and applications	●
	Improve and control security of infrastructure and privacy of data	●
	Achieve process and data integration	●
	Increase the reliability, consistency and accuracy of data sharing	●
	Reduce redundancy of data, applications and infrastructure	◐
External	Digitising procurement services from and to business sector	◐
	Increase collaboration with private sector	●
	Quick processing and response to citizens' needs and expectations	●
	Provide new services to citizens and business	●
	Increase collaboration among public sector organisations	○
	Enhanced availability of government information and its access to citizens	●

Table 5.14: Classification of MOC's E-government Benefits

5.7.7 MOC's E-government Barriers

Although the position of the MOC in the e-government growth model is advanced compared to other government organisations, there are some critical barriers according to interviewees. These barriers had been experienced while sustaining the current progress of e-government projects, also during the development of the MOC's capabilities to provide additional

interactive services and electronic monetary transactions to its clients, as well as continuing the movement towards automating business processes and practices.

Interviewees agreed that the ICT infrastructure is the main barrier, due to the lack of necessary IT tools and systems, such as integration technologies, middleware applications, and some e-business systems. The lack of these IT tools had negatively influenced the implementation process of e-government projects. For example, there was some duplication of clients' records and redundant data in some information systems, due to lack of essential integration tools. This problem had hindered the development process of the MOC's infrastructure towards implementing Stage 4 of the growth model, that is, integrating government organisations' portals into a single e-government portal.

Interviewees also expressed concern about the security issue surrounding electronic services and transactions. There were many aspects with regard to security, for example some managers expressed concern about unauthorised access to internal networks and the interception of messages by third parties. Also, some interviewees mentioned that the emergence of innovative viruses and worms still represented problems for their systems' performance despite the organisation's installing the latest virus scan engine. However, these issues should not stop the organisation from progressing towards providing electronic services for clients and developing business processes, according to interviewees.

Although the MOC had attempted to overcome some of the challenges concerning the ability to provide e-government services, such as lack of essential IT tools and security technologies by using Application Service Providers (ASP) outsourcing as one type of solution, the shortage of qualified IT workers was a concern of the organisation's management, and was ranked a significant barrier to the e-government implementation process. The shortage was due to the difficulty in attracting and retaining the right IT talent because of competition from the private sector which offered high salaries and attractive allowances. Throughout the case study, the e-commerce director was planning to build in-house provision jointly with an outsourcing of some complicated IT solutions. The organisation is intending to use the ASPs and existing strategic partners to train its IT staff to form a learning network to enhance their

skills and utilise common performance measures. This will allow the implementation of e-government projects in-house and under the MOC's control and management.

Interviewees pointed out that there had been resistance from employees to changing the traditional methods of conducting business in the initial stages of implementation, but this resistance had been significantly reduced by the intervention of top management, for example the assistant undersecretary who closely observed the project's implementation process. Information technology training courses were one of the solutions provided to employees to educate them on how to use computer systems and basic applications such as word processing and database applications. Another solution was providing internal presentations and workshops illustrating the benefits of automating some business operations and practices. A final approach was showing top management's strong commitment to the usage of new business systems within the organisation's departments, and refusal to accept any excuses for not using the computer system in all business functions.

Some senior interviewees did not reveal the amount spent on e-government projects or the allocated budget for such projects, and hence did not give a direct answer about how financial resources might impact negatively on the implementation process of e-government, and whether they considered it a barrier. However, interviews with mid-level and low-level staff provided some clues about this issue. Although the MOC had achieved good progress in e-government, interviewees reported that some e-government related projects' proposals had been frozen for an unlimited time because of a shortage of financial resources from government. For example, there had been a proposal from the IT department to strengthen the security architecture by installing additional firewalls, and also to upgrade the existing application servers to increase their capacity and throughput, but this proposal has not yet been approved by management because of an insufficient available budget.

In interpreting the case data, it seems business process reengineering and organisational restructuring are not a concern of management, since they do not cost as much as hardware, software and development. This is an indication that tangible operational cost represents a barrier for the MOC to develop e-government projects.

The barriers of e-government adoption in the MOC are analysed and classified according to category and level of importance in Table 5.15.

Category	E-government Barriers	Level of Importance
Organisational	Unclear vision and management strategy towards e-government	○
	Lack of coordination and cooperation between departments	○
	Lack of effective leadership support and commitment amongst senior public officials	○
	Complexity of existing business and management processes	●
	Absence of business rules and documentation	●
	Cultural issues	○
	Resistance to change	○
	Insufficient time and amount of work required to maintain e-government projects	●
	Political issues	○
	Resistance to share information and knowledge	○
IT infrastructure	Shortage of reliable networks and communication	○
	Inadequate network capacity or bandwidth	●
	Existing systems incompatible and complex	●
	Lack technical standards and common architecture policies, specifications and definitions	●
	Lack of integration across government systems	●
	Lack of knowledge regarding e-government interoperability	●
	High complexity in understanding processes and systems in order to redesign and integrate them	●
	Lack of enterprise architecture	●
	Unavailability of e-government software, systems and applications	○
	Integration technologies of heterogeneous databases are confusing	●
Qualified Staff	Lack of IT training programmes in organisation	○
	Shortage of well-trained IT staff in market	●
	Shortage of management skills staff	●
	Lack of employees with systems' integration skills	●
	No time for training staff in new technologies	○
	Complexity of government's recruitment process	●
	Shortage of salaries and benefits in the public sector	○
	Flow of IT specialist staff	●
Operational Cost	Complexity of the financial supply process from the Cabinet Office	○
	Lack of financial resources in public sector organisations	●
	High cost of IT professionals and consultancies	○
	High cost of required hardware and software	●
	High cost of installation, operation and maintenance of e-government systems	○
	High cost of training and developing staff	○
Security and Privacy	Threats from hackers and intruders	○
	Threats from viruses, worms and Trojans	○
	Insufficient budget for security technologies and solutions	●
	High cost of security applications and solutions	○
	Unauthorised external and internal access to systems and information	○
	Lack of knowledge and vision for importance of security	○
	No assurance that transaction is legally valid	○
	Lack of security rules, policies and privacy laws	○
	Inadequate security level of organisational hardware and software infrastructure	○
	Absence of privacy of personal data	○

Table 5.15: Classification of MOC's E-government Barriers

5.7.8 Lessons Learned from MOC's Case Study

- The updating and development of strategic plans in reflection to the external changes represent a key factor for a successful and smooth e-government implementation process.
- The MOC characterised by flat organisation structure, formal working relationships, and staff development is limited. These characteristics made the organisation more flexible to adopt e-government and implement relevant IT projects.
- The use of non-in-house technology development through outsourcing and strategic partners has provided benefits for the MOC. However, in long term, outsourcing will create dependency on the contractor and reduce the motivation of existing IT staff due to the perception that everything related to IT is the responsibility of the vendors.
- The commitment from and direct participation of senior managers were one of the main ingredients of success to reach advanced stage of e-government implementation. Therefore, the indications that lead to have organisational barriers were almost unavailable.
- The lack of coordination between the MOC and CIO has led to resources duplication, such as hardware and software, and inconsistent of technical standards, protocols, and policies. It has also delayed the connection of the front-end applications of MOC portal with other government organisations' systems.
- The participation of stakeholders in the process of e-government implementation and awareness of its benefits have reduced the resistance to the minimum level. This shows the importance of given presentations, workshops, and distributing of leaflets and guidelines to staff members that describe the benefits of e-government projects.
- The electronic transactions law which set by the MOC and legislative committee was starting point to provide a legal base for e-government. However, this law is unable to address the non-reputation issue of G-to-G transaction and also the citizens' rights when interact with government portal. This law also need to be updated periodically to ensure it meets the global standards of the legislative system.
- The level of e-government benefits has been raised during the case study of the MOC since the maturity degree approached by the MOC (i.e. Stage 3) produced significant advantages for the organisation. Such as creating adaptable culture for e-government adoption by eliminating barriers between the organisation levels and across business departments, and reducing the complexity of business processes within the organisation and also between the MOC and the Municipality.

5.8 Conclusions

This chapter has analysed the practices of e-government implementation in three government case studies in the Kingdom of Bahrain, namely the CIO, Ministry of Commerce, and Ministry of Labour and Social Affairs. The maturity level of e-government adoption was analysed for seven government organisations, and the result revealed that most of organisations are situated between the first and second stages, according to the stage of growth model for e-government proposed by the researcher. Only a few government Ministries, notably those concerning business regulations, have stepped into the advanced stage. The three case organisations had reached a different maturity stage: the CIO was in Stage 1, the MOLSA had stepped into Stage 2, and the MOC is the only government organisation to meet the entire requirements of Stage 3, and achieved two-way communication services and provided end-to-end transactions between the Ministry on the one hand, and citizens and business on the other, supported by a reliable payment process engine.

According to the empirical data from these case studies, the proposed conceptual framework which consisted of the stage of growth model, the Technology-Organisation-Environment model proposed by Tornatzky and Fleischer (1990), and the benefits-barriers model, were appropriate for the research context, the Kingdom of Bahrain, since these factor components were precisely identified by the researcher as influencing the process of e-government adoption in all case organisations. The analysis and study of the stage of growth model were made carefully and specifically to fit and be compatible with the context of government organisations in Bahrain. Therefore, it was apparent from the empirical data that the proposed four stages were designed or applied by these case organisations in their practices of e-government adoption. However, the full assessment of and modifications to the proposed framework and associated factors will be elaborated in Chapter 6, where all parts of the conceptual framework will be revised (i.e. stage of growth model, Technology-Organisation-Environment model, and benefits-barriers model).

Key conclusions drawn the implementation process of e-government in the CIO, MOLSA and MOC are summarised in the following points:

- According to the evaluation in Table 5.2, the maturity level for e-government adoption in government organisations is still in the infancy stage since most organisations are situated around Stages 1 and 2. Empirical data from the three case studies revealed that one reason for this is that the emergent projects surrounding the e-government architecture within the organisations are struggling with the existing ICT infrastructure, since many of their IS applications are legacy systems and work under a mainframe environment. Further, they are not compatible with some e-government systems, which makes it difficult to interconnect them with front-end applications of a government organisation's website, and hence to automate and integrate the latter's business processes.
- Empirical evidence elicited from case studies points to political development in Bahrain and its direct influence on internal political desire, represented by active commitment from top management in case organisations for the adoption of e-government. The evident support from organisations' officials to open up a way to e-government implementation had also motivated organisations' employees towards e-government adoption. This had become influential factor for e-government implementation within government organisations. However, these organisations seem to struggle against several barriers preventing full realisation of providing online government information and services. Hence, when Bahrain's government desires to proceed to advanced stages of e-government, it will need to help organisations overcome the barriers that been have experienced.
- Government organisations have continued to develop information systems for e-government in isolation from one another, with minimal central oversight and coordination. The result is highly complex and disaggregated e-government information systems architecture. Combined with the present highly decentralised e-government implementation, the CIO's capacity to influence e-government developments is limited, particularly since the CIO is devoting its resources to implementation of the national smartcard. However, recent studies and experiences suggest that in order to achieve IT strategy goals, central control and incentives are vitally important.

- The detailed presentation provided in each case study revealed that each case organisation was characterised by differing size and context. The organisational size factor is based on the volume of information and services processing within the organisation and provision to people, and also the number of employees. The MOLSA is one of the largest government organisations among case organisations and its implementation process towards e-government is considered slow, and it had experienced many organisational barriers; the CIO is of medium size, but still struggled with complexity of business processes; whereas the MOC is considered a relatively small government organisation, and not many organisational barriers had been identified. Therefore, this has validated the implication of the organisational size factor in the process of e-government implementation since the complexity of organisation structure and large volume of services and business rules in the case organisation make the implementation of e-government more complicated.
- Organisational structure and culture have a powerful impact on the ability of government organisations to build e-government related IT projects. As presented in this chapter, culture and structure also contribute to resistance to change for political reasons. The complexity of existing business processes, the absence of business rules and management operations documents within the organisation, unwillingness to share and exchange data, resistance to change the way running traditional business, working as competition rather than collaboration among sections, and the lack of rewards and incentive schemes play a negative role and restrict the growth of the e-government projects within government organisations, and hence degrade the efficiency of organisations' websites.
- Another factor associated with the adoption of e-government is IT staff. Empirical evidence indicates that competition from the private sector, in terms of higher salaries, attractive allowances and incentive schemes, increases the flow of IT staff from government organisations to private companies. This had led to a shortage of qualified IT staff within government organisations, although some provided good, advanced training courses. It is also noteworthy that the shortage of staff in government organisations was not restricted to those with IT skills; there was a shortage of personnel with management skills essential for analysing and reengineering the business processes and documenting the business and management rules.

- The analysis of e-government barriers elicited from case organisations indicates that tangible operational cost, such as high cost of required hardware and software, and insufficient financial resources from government, have a negative influence on the ability of government organisations to provide electronic monetary transactions to citizens. It had also noted that the MOC has the lowest number of barriers compared to the CIO and MOLSA. The reason for this is that high commitment and support from top management, including the Minister, through direct participation in all e-government projects committees and intervention to solve any arisen problems. Also the MOC involves its stakeholders in the implementation process by regular meetings, presentations, and workshops had been held, to which stakeholders among the organisation's departments had been invited to. However, the MOLSA has the highest barriers, especially in the organisational aspect. This is due to less support from top management and cultural issues that delay the implementation process of e-government projects. Although the CIO is equipped with advanced ICT tools to connect government organisations and provide high speed data transmission, its e-government website lacks dynamic information and interactive services. The reason for this is shortage of well-trained IT staff in the market and complexity of the government's recruitment process. The CIO also connects its IT staff for the implementation of national smartcard, and hence there was not sufficient time for IT staff to maintain the e-government website.

Chapter 6

Revision and Validation of Conceptual Framework for E-government Adoption

In Chapter 3, the conceptual framework for e-government adoption was proposed and discussed. Since the aim of this research is to validate the proposed conceptual framework to provide a frame of reference that can be used as decision-making tools for government officials and a research background for e-government researchers, Chapter 5 presented and analysed the empirical data which were collected in three case organisations. The empirical evidence revealed that the conceptual framework would be applicable if it was modified and restructured. In doing so, this chapter revises this framework and considers the suggested modifications, such as restructuring the stage of growth model, and derives new influential factors. This Chapter also revises benefits-barriers model and identifies new barriers and benefits that derived from the study of case organisations.

6.1 Introduction

The adoption of e-government has become an important strategic action plan for the public sector since it is fundamental in modernising government business processes. Many IT managers believe that e-government adoption will raise efficiency and save money through increased centralisation of resources, unify government IS applications, and funnel all IT initiatives through qualified IT professionals. However, the adoption and implementation aspects of e-government have not been given adequate attention in the research literature. A number of voids exist regarding a suitable framework for the process of e-government adoption in public sector organisations. Therefore, this chapter contributes towards developing a framework that can increase understanding of e-government adoption through identifying factors associated with the implementation process.

This chapter offers empirical data derived from the three case organisations that can be used as evidence to revise the proposed conceptual framework of e-government, as presented in Chapter 3. In doing so, the chapter is structured according to the revision process of the components that build the proposed conceptual framework. In Section 6.2.1, the researcher revises the central part of the conceptual framework which is the stage of growth model. The modifications of this model concern two aspects, restructuring the implementation sequence of the proposed stages, and reforming the objective and functionality of the last stage. Section 6.2.2 revises the second component of the proposed framework, the Technology-Organisation-Environment model. The empirical evidence supported the factors associated with this model, in conjunction with eliciting new factors such as Strategic Partners, Management Skills as part of Competencies, Political Desire, and Management Process. In Section 6.2.3, the third component of the proposed conceptual model is revised, the Benefits-Barriers Model. The empirical findings confirmed the substantial influence of these factors on the implementation process and presented the dimensions which played an effective role in the working groups' performance in modernising technologies and management within the organisations.

Accordingly, the chapter concludes with the proposition of a novel empirical framework for the adoption of e-government that can be used by government organisations as a roadmap for following the process of e-government implementation. In addition, it will be of benefit for the government officials as it can be used as a tool for decision-making when they intend to adopt an e-government initiative.

6.2 Revised Conceptual Framework for E-government Adoption

As discussed in Chapter 3, the proposed conceptual framework consisted of 3 different models, namely the stage of growth model, which represents the central part of the proposed framework, technology-organisation-environment model, and benefits-barriers model (see Figure 3.1). In Chapter 3, the researcher attempted to develop an appropriate framework that could fit the context of case studies in the Kingdom of Bahrain. In doing so, become a flexible basis that can be validated and tested through fieldwork.

As explained in detail in Section 5.4, the application of the proposed conceptual framework in fieldwork had been placed in different contexts among case organisations, namely level of interaction (e.g. G-to-G, G-to-B, G-to-C), organisational size (e.g. small, medium, large), and maturity stage of e-government implementation (e.g. Stage1, Stage 2, Stage 3). This would help to develop an integrated framework that can be used as a roadmap in any context of government organisations for the adoption of e-government. In doing so, the researcher developed an evaluation matrix that shows the similarities and differences of the proposed models and their components across the three case organisations. The following Table 6.1 shows the synthesis of the revised conceptual framework components using findings derived from empirical data. This Table confirms the validity of the conceptual framework and also identifies new factors that influence the process of e-government implementation.

As presented in Table 6.1, the empirical data derived from the case studies revealed that the proposed conceptual framework that consisted of the stage of growth model, the Technology-Organisation-Environment model proposed by Tornatzky and Fleischer (1990), and the benefits-barriers model, were adaptable for the research context; the Kingdom of Bahrain. The reason for this is that these factor components were precisely identified by the researcher as influencing the process of e-government adoption in all case organisations. The selection of suitable stage of growth model, during literature analysis, was made in systematic way and exclusively to fit and be compatible with the context of government organisations in Bahrain. Hence, the revised framework could not be generalised to other country in the world that have different government structure and level. However, in some cases, this framework could be applied, with minor modifications, in a country that has similar characteristics, structure and culture, such as State of Qatar and Kuwait.

Models Components	Case Organisations		
	G-to-G	G-to-C	G-to-B
	CIO	MOLSA	MOC
Implementation Process	Focus more on ICT infrastructure and unify government IS applications (Achieved requirements of Stage 1 and most of Stage 4)	Development of e-government projects is slow and time-consuming (Achieved requirements of Stage 1 and many of Stage 2)	Focus more on front-end applications and development of portal is high (Achieved requirements of Stage 3)
Organisation Context	Complex business processes, centralisation	complicated structure, cross-departmental boundary	Flat structure, less bureaucratic, positive collaboration
IT infrastructure	Advanced communication architecture (GDN), many legacy systems, highly influence e-government projects	Development of ICT infrastructure is very slow and many of heterogeneous applications, highly influence e-government implementation	Continual development of ICTs, outsourcing many of IT and portal applications, somewhat influence e-government implementation
Competencies	IT and management skills influence implementation of e-government	IT skills highly influence implementation of e-government projects	IT and management skills influence implementation of e-government
Organisation Size	Medium size, influence e-government projects	Large size, negatively influence e-government projects	Small size, positively influence e-government progress
Strategic Partners	Support many of e-government projects and especially smartcard and GDN	No indications about partnership since no much progress in e-government	Many partners involved, highly influence implementation of e-government projects
Competition Pressure	Exist in many e-government projects and influence IT teams	Exist but without real achievement	Exist and influence working groups
Financial Resources	Influence e-government projects	Highly influence implementation of e-government projects	Influence development of ICT infrastructure and somewhat e-government
Management Process	Cultural, political and resistance to share data, highly influence e-government projects	Complexity of business processes and models and lack of top management contribution, highly influence e-government projects	Involvement and participation of top management and stakeholders, positively influence e-government
Political Desire	Represented by Cabinet Office and senior managers, highly support adoption of e-government	Represented by Cabinet Office but lack of senior managers support, negatively influence e-government adoption	Represented by Cabinet Office and active support of senior managers, positively influence e-government projects
Benefits	Technical is common benefit for e-government adoption	Technical is common anticipated benefit for e-government adoption	Organisational and technical are common benefits for e-government adoption
Barriers	Highly influence e-government projects, specifically organisation and qualified staff	Highly influence e-government progress, specifically IT infrastructure and organisation	Influence e-government, specifically qualified staff

Table 6.1: Synthesis of Revised Framework Components across Case Organisations (Evaluation Matrix)

However, the findings of the empirical analysis illustrated in Chapter 5 provided significant modifications for the proposed model. The implementation sequence for the stages of growth model has been restructured, and the functionality of Stage 4 of the growth model has been changed (the revision of this model will be elaborated in Section 6.2.1). The reason for this is that the strategy for implementing e-government in Bahrain was based on a series of projects, and the priority for implementing these projects was based on certain factors, such as available budget, political desire, and compatibility with existing IT systems, which will be explained in Section 6.2.2.

According to Chapter 5, the analysis of empirical data revealed that the most of factors proposed in conceptual framework have been supported by fieldwork, as presented in Table 6.1. The findings also have derived new influential factors that should associate with the revised framework in which they were playing an important role in the process of e-government implementation in Bahrain. The significance of these factors is that the influence to process of decision-making in all case organisations and consequently determine the maturity level of e-government adoption, such as the CIO has achieved the requirements of Stage 1 and also some of Stage 4, the MOLSA almost has addressed the characteristics of Stage 2, and the MOC passed over Stages 1 and 2, respectively and now it is approaching Stage 3.

A detailed presentation of the case organisations in Chapter 5 has confirmed the role of benefits-barriers model in the revised framework. The findings have supported many of barriers and benefits that have found in the literature as Chapter 2 reported. In addition, empirical data has derived new benefits that promoted the case organisations to adopt e-government and also has identified new barriers that negatively influenced to the implementation process of e-government in Bahrain; Section 6.2.3 explains the Benefits-Barriers model.

The following sections will elaborate on the revision of the proposed conceptual framework and provide a detailed description for the revised models and their components, which is illustrated in Figure 6.1.

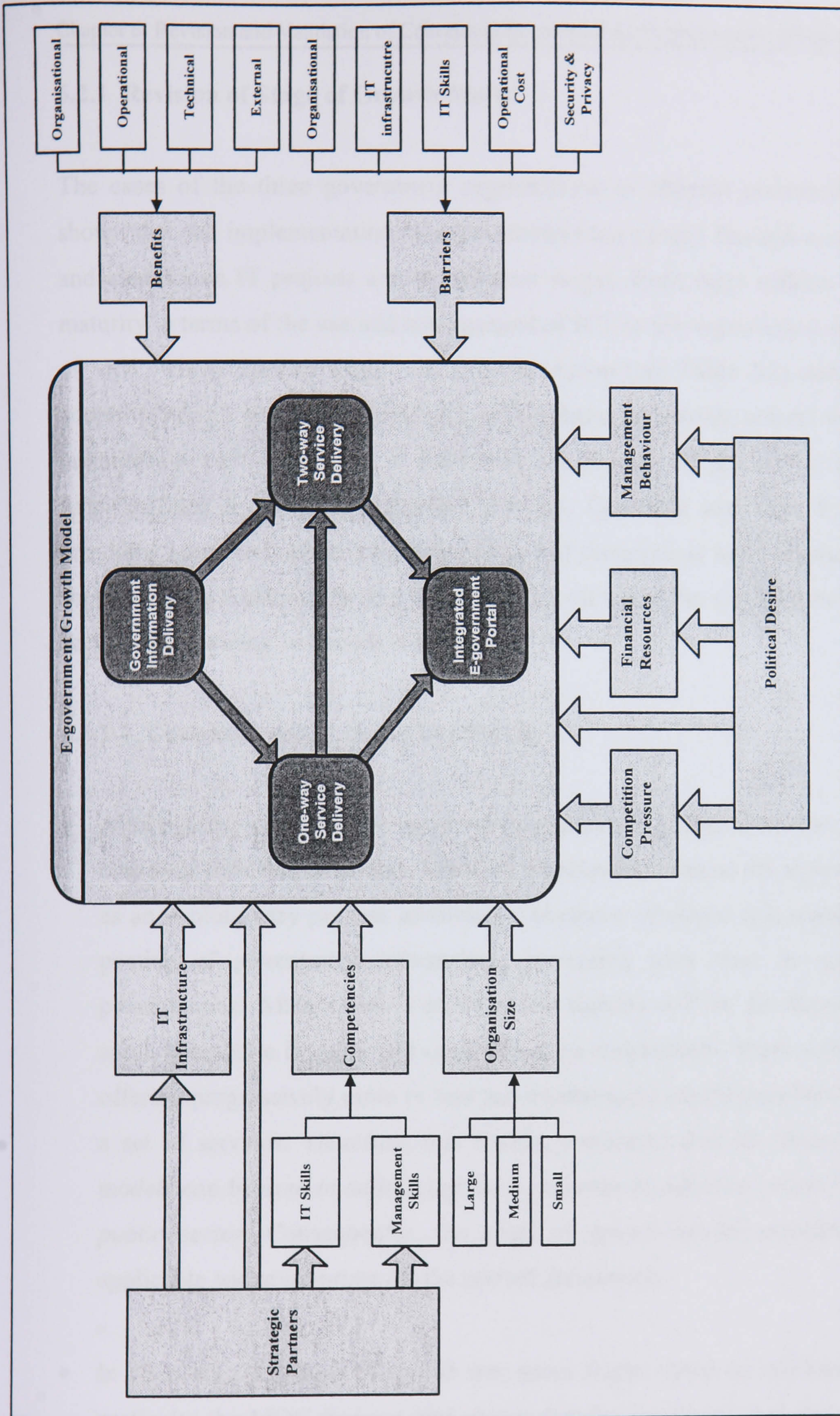


Figure 6.1: Revised Conceptual Framework for Adoption of E-government

6.2.1 Revision of Stage of Growth Model

The cases of the three government organisations in Bahrain presented in Chapter 5 have shown that the implementation of e-government has passed through a number of successive and identifiable IT projects among different stages. Each stage reflects a particular level of maturity in terms of the use and management of ICT in the organisation. In particular, the case of MOC which reached Stage 3 of implementation (see Table 5.2) started the first stage of adoption from 5 years by launching a new website to provide general information about the organisation, and afterwards, it developed a collection of projects to advance the website functionalities to provide interactive services. Currently and after 5 years, the MOC is providing advanced online monetary end-to-end transactions to its clients (i.e. Stage 3). This supports the necessity of having a stage of growth model for e-government adoption in public sector organisations, as shown in Figure 6.1.

6.2.1.1 Lessons Learned from Case Studies

- Although the speed of e-government implementation process in case organisations varies, empirical data indicated that each case organisation viewed the adoption of e-government as an evolutionary process involving a sequence of stages that starts with an initial web posting of government information, increasing over time in quantity, quality, and presentations. After a period of time, this website will be developed by the addition of some interactive features and capabilities for constituents. Then, some agencies will start offering progressively more or less full transactional capabilities between constituents and a set of services. Therefore, this finding confirmed that *the theory of stage of growth models can be used in addressing the e-government adoption process in the context of the public sector*. Consequently, the stage of growth model presented in Figure 6.1 is applicable and appropriate for the revised framework.
- In all cases, interviewees agreed that some stages could be *implemented in parallel*, in particular the MOC findings had shown that the developers had been working in stage 2 (One-way services delivery) and stage 3 (Two-way service delivery) at the same period. The MOLSA on the other hand had performed most of the requirements of stage 2 and some of stage 3, but when the resources are available, the MOLSA can perform both

stages in parallel. The CIO has the same perspective, and hence it plans to implement stage 2 and 3 in parallel for saving time. These findings are justifying the change of implementation stages sequence that proposed in Chapter 3 into new structure for the revised of stage of growth model of conceptual framework. The new structure of the revised growth model, as shown in Figure 6.1, shows that the complete adoption of stage 1 leads to the implementation of stages 2 and 3 in *parallel*, and in the situation of shortages of resources, the implementation of stage 2 would be easier than stage 3, since it is less complex, as will be discussed later, and hence the stage 2 comes first after stage 1, and then can lead to stage 3. This can be illustrated from the Figure 6.1 that shows two arrows come out from the Stage 1 and lead to the Stages 2 and 3 (parallel implementation), and also, as discussed above, another arrow indicates that Stage 2 leads Stage 3 in term of implantation process.

- Findings of cases analysis indicated that *complexity of the implementation process for e-government increases gradually when reaching higher stages*. Since the higher stages need sophisticated ICT tools to be incorporated with the existing systems and employ professional IT staff, case organisations attempted to outsource some of the ICT requirements and to cooperate with strategic partners from the private sector as will be presented in section 6.2.2.3. Table 6.2 shows the complexity level for each implementation stage, as analysed from empirical data.
- Empirical evidence suggested that the objective and functionality of last stage (i.e. Stage 4) should be changed, as illustrated in Figure 6.1. Hence, Stage 4 of conceptual framework has been reformed from *Government Integration* to *Integrated E-government Portal*. The reason for this is that the major works for integrating and connecting the most active back-end information systems across government organisations had been established throughout the GDN architecture project as presented in Chapter 5. Therefore, all case organisations emphasised that the works left are about generating a single e-government portal and integrating its front-end IT applications to the GDN architecture. The details of this stage are explained in Table 6.2.

- Empirical data supported that *four implementation stages were sufficient and consistent* for the process of e-government implementation. As illustrates in Figure 6.1, these stages are Government Information Delivery, One-way Service Delivery, Two-way Service Delivery, and Integrated E-government Portal. Each stage determines the maturity degree of e-government adoption in government organisations. However, there were little evidence that a fifth stage would be useful for designing a personal profile for each citizen, which aimed to provide a personal account and e-mail. This feature, as concluded from the cases findings, can be incorporated within the revised last stage (i.e. integrated e-government portal), and the Table 6.2 explains this feature involved within the revised stage.

Table 6.2 summarises the findings derived from the empirical data for the revision of the stage of growth model. It identifies and describes the stages of adoption based on stage of growth model as portrayed in Figure 6.1, demonstrates the implementation sequence for each stage, and identifies the complexity level that associates with adoption process of each stage.

Revised Stage	Description	Implementation Process	Complexity Level	Case Organisations
Stage 1: Government Information Delivery	<ul style="list-style-type: none"> • Creating government organisation website. • Posting static information through government website. • Introducing Internet and intranet to organisation 	First empirical phase of e-government adoption, implemented <i>distinct</i> from other stages.	Not complex and straightforward implementation. Requires minimum level of advanced technology tools and management support.	<ul style="list-style-type: none"> • CIO • MOLSA • MOC
Stage 2: One-way Service Delivery	<ul style="list-style-type: none"> • Developing interactive services to citizens • Providing higher level of information. • Public sector organisations communicate to citizens through providing dynamic information. • Downloading online application forms from organisation servers • Establishing channels with government officials 	Second empirical phase of e-government adoption that can be implemented in <i>parallel</i> with Stage 3.	Somewhat complex stage that requires integration of front-end applications with back-end systems. Requires data-transfer tools that facilitate information retrieval from organisation databases.	<ul style="list-style-type: none"> • MOLSA • MOC
Stage 3: Two-way Service Delivery	<ul style="list-style-type: none"> • Generating two-way communication between citizens and government. • Allowing citizens access to organisation back-office electronically to complete transaction processing • Performing secure electronic payment services. 	Third theoretical phase of e-government adoption but empirically can be implemented directly after Stage 1 and in <i>parallel</i> with Stage 2.	Complex implementation stage that requires sophisticated ICT tools and management support. Requires security and confidentiality technologies to provide secure transactions and effective records management system linked with back-end database system	<ul style="list-style-type: none"> • MOC
Stage 4: Integrated E-government Portal	<ul style="list-style-type: none"> • Generating one-stop government portal. • Integrating and connecting government organisations front-end applications across different levels of departments. • Interchanging results of transactions between one organisation system and another system • Creating customised citizen profile that includes personal account and e-mail 	Last empirical stage of e-government adoption that can begin after integrating government back-end systems with front-end applications and modernising the ICT infrastructure of government organisations.	Highly complex implementation stage that requires high capability of ICT infrastructure across country and continual top management support.	None

Table 6.2: Revised Stages Model for E-government Adoption Process

6.2.2 Revision of Technology-Organisation-Environment Model

The Technology-Organisation-Environment Model by Tornatzky and Fleischer (1990) includes three key factors (Figure 3.5, Technology, Organisation and Environment), each of which contains multiple factors as discussed in Chapter 3. Most applications of this model in the literature were in private sector organisations, such as Chau and Tam (1997), Kuan and Chau (2001), Scupola (2003), and Zhu *et al.* (2002), as presented in Chapter 3. However, some authors (e.g. Cahill *et al.*, 1990; Ang *et al.*, 2001; Scupola, 2003) have found that this model gave greater explanatory power to the successful use of IT in various government settings than any one single category of factors. In regard to this research, empirical evidence supports this view and shows that *this model plays an important part in the implementation process of e-government in case organisations as public sector*. In addition to the validated factors that were a part of this model (e.g. IT infrastructure, Competencies, Organisation size, Financial resources, Competition pressure), empirical analysis in Chapter 5 derived new influential factors that contributed significantly in the process of e-government adoption, such as *Political desire, Management skills, Strategic partners, and Management process*, as illustrated in Figure 6.1, and discussed in the following sub-sections.

6.2.2.1 IT Infrastructure

As reported in Chapter 5, the study of case organisations found that the complexity of the existing IT infrastructure, organisation networks and communication capabilities, and availability of reliable security and privacy tools have influenced the organisations' decision towards progress from the existing stage to the subsequent one. This factor is in accordance with the literature (Ang *et al.*, 2001; Caudle, 1991; Chau and Tam, 1997; Kuan and Chau, 2001; Lee *et al.*, 2003) which reported IT infrastructure as a factor that affects the adoption of many IT projects. Caudle (1991) supports this view, and states that the existence of adequate IT equipment and technologies in the organisation is a major determinant of adoption of new innovation. For example, the limitation of network capacity and bandwidth, the legacy of many applications and database systems, and absence of security and privacy tools in the MOLSA had affected the decision of Technical Services director and IT managers to proceed to higher adoption stages, which in turn delayed the implementation process of e-government. Moreover, most interviewees in CIO emphasised that the ICT infrastructure should come first

to provide effective electronic services and reliable monetary end-to-end transactions. Further, integration was another limitation that has been derived from case studies analysis, especially when the implementation process reaches the last stage (i.e. integrated e-government portal). There are many incompatible and heterogeneous information systems across government organisations that require the organisations IT department to reengineer their business processes and upgrade their hardware and software (see Table 5.5). Those case organisations which most of their IT applications are web-enabled and compatible with e-government projects have approached advanced stages of adoption (e.g. MOC), and vice versa (e.g. MOLSA). Although the CIO adopted new integration technology from IBM, based on the EAI approach called the MQ series, to address the integration problems, this technology still does not solve processes integration among organisations and also does not connect all governmental bodies. Consequently, the capabilities of IT infrastructure is influenced the four stages of implementation process of e-government, as illustrated in Figure 6.1.

6.2.2.2 Competencies

The cases of the three organisations presented in Chapter 5 have shown that e-government implementation among the four stages required substantial investments of qualified staff. The empirical data have validated the effectiveness of IT skills in the implementation process, and also have derived a new dimension of competencies, which is management skills.

Management Skills

Although there is much literature (Cabinet Office, 2000; Chen, 2003; Chircu and Kauffman, 2000; Heeks, 1999; Heeks and Bhatnagar, 1999; Lee *et al.*, 2003; Norris, 1999; Pavlichev, 2004) which supports qualified IT staff as being one of the critical factors which influence the implementation of e-government and IT projects, there is little about the important role of management skills during the implementation process of e-government.

The implementation of e-government projects, as shown from empirical data in Chapter 5, has needed integration of the ICT function into management processes that include strategic planning, organisational business practices reengineering, decision-making process design, project evaluation, business models and procedures documentation, financial and marketing organisation, operational management, and services analysis and design. Therefore, these competent management skills influence the implementation process of e-government, for

example the CIO was assigning IT staff with a computer science background to the project for analysis and reengineering of business processes and practices for some government organisations. As most of the CIO staff come from a computer programming and technical background, this had caused delay in the reengineering project, and inappropriate designing of new processes, in particular during the implementation of the national smartcard project. The reason for this is that those staff do not have sufficient management skills and experience in operational management and business process reengineering techniques, and also such skills was not available in the market.

IT Skills

The analysis of the empirical data confirmed that the case organisations needed qualified IT staff in all implementation stages, but this need would be higher in stages 3 and 4 since these stages consider more complicated, as shown in Table 6.2. As reported in these cases, there was a lack of skilled employees qualified to handle integration problems, Oracle database design and development, network and communication engineering, web applications development, and systems engineering.

Empirical evidence indicates that competition from the private sector in terms of higher salaries, attractive allowances and incentive schemes increased the flow of IT staff from government organisations to private companies. This led to a shortage of qualified IT staff within government organisations, and hence affects the implementation process of e-government projects, as shown in Figure 6.1. Empirical data also revealed that government, represented by the Civil Service Bureau (CSB), played a negative role in this issue. The complex recruitment process and bureaucratic procedures that running in the CSB had delayed many enrolment applications (i.e. 3-7 months) which had led to many qualified IT staff flowing to other organisations and not motivated to work in the government.

6.2.2.3 Strategic Partners

A new factor derived from the analysis of empirical data is Strategic partnering between government organisations and the private sector, such as local alliances, vendors and IT contractors. There is much literature which has highlighted the role of partnership support from private sector in successful implementation of IT projects, such as Allen *et al.* (2001), Bishop (1999), Heeks (1999), and Richardson (2004).

Data collected from case organisations revealed that the IT vendors' support and local partners from the private sector have positively contributed to the implementation process of e-government projects by providing hardware and software components, feasibility study, training, consultations, outsourcing of some IT applications, and afford skilled IT staff. This was clearly stated by interviewees in the most successful case organisation, the MOC.

Most implications of partnerships were derived from the opportunity to leverage the competencies of specialists, IT and management skills, as illustrated in Figure 6.1. Also, this had a higher effect on the implementation of Stage 2 and 3 which require advanced information technologies. For example, data collected from the MOC, as presented in Chapter 5, indicated that one of their critical success factors that had played a significant role in moving the MOC into Stage 3 was the support from the private sector partners. In particular, from the area of IT infrastructure and qualified IT staff. Many MOC developers come from private sector, such as Microsoft, Oracle and IBM, some communication specialists come from BATELCO, the telecommunications services provider, and also there is an active relationship with payment gateway providers such as BBK. The argument with the MOC management has revealed that outsourcing usually involve the allocation of the organisational resources to areas that can add greater value to the organisation's value chain or reduce cost per transaction due to economies of scale. In the early stages of implementation, when the MOC had insufficient in-house IT expertise and lacked the necessary IT and security tools, it hired IT and management competencies, and outsourced some advanced IT resources from vendors, and some of these outsourcing are still exist.

Additionally, the CIO worked with one partner for four years, as discussed in Chapter 5, side by side, to analyse ICT requirements for the GDN project, provide most of the hardware required, design the processes, and develop the architecture of the GDN. This provides an indication of the influence of a strategic partnership to fill the gaps of IT infrastructure and competencies within the case organisations, and consequently support the implementation process of e-government projects, as shown in Figure 6.1.

6.2.2.4 Organisation Size

Small organisational size is organic compared to a more bureaucratic structure in large organisation (Ghobadian and Gallear, 1996; Zhu *et al.*, 2002). A small organisation, such as the MOC, is characterised by a flat organisation structure, reduced bureaucracy, and small

volume of information and services processing compared to a large organisation, and staff development is limited. The empirical data collected from the three case organisations indicated that these characteristics make a small organisation (e.g. MOC) more flexible to environmental and internal change, and it is perceived as being significantly more adaptable than a large organisation (e.g. MOLSA) to adopt e-government projects.

The MOLSA has greater volumes of transactions, more geographically dispersed operations, more supply chain partners, and more information to manage, and thus would be more likely to adopt IT systems to improve operational efficiency. However, the MOLSA development process towards reform of its internal ICT infrastructure and moving towards advanced e-government implementation stages was considered slow, and had experienced many of organisational barriers (see Table 5.10). The CIO is of medium size, but still struggles with the complexity of business processes, whereas the MOC is considered a relatively small government organisation and not many organisational barriers had been identified (see Table 5.15). Therefore, this has validated the implication of the organisation size factor in the process of e-government implementation, as shown in Figure 6.1.

6.2.2.5 Competition Pressure

This factor has been validated and discussed frequently in the literature related to private sector organisations, and it recognised as an adoption driver for IT innovation (e.g. Caldeira and Ward, 2002; Crook and Kumar, 1998; Iacovou *et al.*, 1995; Scupola, 2003; Thong, 1999; Zhu *et al.*, 2002). Many authors have reported that the public sector lacks competition, such as Heeks and Bhatnagar (1999) who claimed that public sector organisations rarely find themselves in direct competition with other organisations in adopting IT projects. However, the empirical evidence of this research, as presented in Chapter 5, has shown the opposite in the case of e-government projects, and considered competition pressure as an important factor that affects the process and decisions for the adoption of e-government projects. The emergence of this factor was through the explicit words of interviewees, and was also introduced from the implicit behaviour that has been observed by the researcher in the case organisations. For example, the project for the national smartcard was managed, monitored and controlled by the steering committee headed by the secretary of the CIO who was pressing all working groups toward implementing this project with a certain timeframe. Thus, different working groups among government organisations had to provide progress reports periodically

to the steering committee. The CIO represented top management's desire to issue the smartcard as soon as possible to become the first country in the GCC region to use the smartcard, and to make it the cornerstone of e-government culture. This is also evidence that political desire played a central role in the adoption behaviour and competition pressure, as will be discussed in Section 6.2.2.8. Hence, this external pressure promoted the working groups to make progress with many e-government projects, as presented in Section 5.5.2 and illustrated in Figure 6.1.

In addition, the analysis of interviews, and also the observation of organisational behaviour, revealed that the rapid movement in some government organisations, such as the MOC, Ministry of Education and Ministry of Health towards the adoption of e-government inside Bahrain has made MOLSA and CIO feel pressure to implement an advanced level of e-government stages when they see more and more organisations in the government making good progress in adopting e-government projects, and therefore feel the need to proceed in order to remain competitive.

6.2.2.6 Financial Resources

According to the empirical evidence derived from data analysis, this factor is a determinant of decision making for the adoption of e-government projects in case organisations. Much literature (e.g. Dembla *et al.*, 2003; Holland and Light, 2001; Iacovou *et al.*, 1995; Irani, 2002; Kuan and Chau, 2001) support the analysis that finance is a significant parameter that influences the adoption of IT innovation. Any investments in IT projects for the public sector that need financial support from government should have approval from the Cabinet Office, which in turn evaluates the value of proposed projects, and then allocates the required budget, if permitted.

Since each of the three case organisations had achieved different levels of implementation stages, interviewees in all three reported that financial resources had influenced the decisions to adopt e-government projects, either to speed up or slow down the process of implementation. For example, the Data warehouse project in MOLSA is relatively expensive, the cost is a prime concern for the IT managers, and hence the implementation process of this project is still in its early stages and is waiting for approval from the Cabinet Office.

The financial supply from government needs efforts from senior managers within government organisations to justify the value of their investments to the Cabinet Office, and therefore

allocation of additional budget from the government. This is based on how much the top management support and understands the benefits of the e-government adoption, and how much this support influenced by political desire in the government, as shown in Figure 6.1. This can be found in the case of the MOC that has an active commitment from the Minister, as presented in Section 5.7.4, whereas this commitment was not sufficient in the case of the MOLSA to provide financial cover to support e-government projects, such as the Data warehouse, ICT reform and security.

6.2.2.7 Management Process

This new factor refers to the organisations attitude towards the adoption process of e-government projects. The involvement of senior managers in the adoption process, organisational business process culture, and participation of stakeholders to build support and reduce resistance are considered the main dimensions of this factor. These entire dimensions have been successfully derived from the empirical data, and have been analysed and discussed in detail in Chapter 5. This section will summarise the dimensions to illustrate their influence on the implementation process of e-government.

The analysis of the case studies reported that the MOC senior officials were involved in the adoption process, for example the assistant undersecretary had a leading role in the development of e-government projects. In the case of any unsolved problems, this official reports them to the development steering committee chaired by the Minister who in turn takes formal action. Further, the interview with the Minister revealed that he was fully aware about the process of projects implementation, and understands the difficulties that the MOC went through (see Section 5.7.4). This involvement and awareness played a central role to reduce the resistance from the employees within the organisation, minimise organisational cultural barriers, and provide necessary financial resources to cover IT requirements. On the other hand, there was no serious involvement from senior managers in the implementation process of IT projects in the case of MOLSA, which caused several organisational problems not to be addressed during the adoption process.

Organisational structure and culture have a powerful impact on the ability of the MOLSA to build e-government IT projects, since interviewees encountered cross-departmental boundaries. The reason for this is the reluctance from other departments to share data, complexity of business processes, and some departmental managers' resisting changing the

way they run organisation businesses (see Section 5.6.3). Therefore, the organisation should be aware of and open itself to the influence of new information systems and applications to benefit from new technologies, which might be suitable for e-government projects. As a result, organisational behaviour clearly affected the implementation process, for instance the MOC had reached the advanced stage of the implementation process due to the participation of stakeholders in the process of e-government implementation and awareness of its benefits have reduced the resistance to the minimum level, and in contrast, the MOLSA struggled to proceed into Stages 2 and 3 of e-government implementation.

Accordingly, it was concluded from the empirical data that the complexity of existing management processes and business models, the absence of senior officials in the implementation process, and the lack of rewards and participation of stakeholders played a negative role and restricted the growth of the e-government adoption process within government organisations.

6.2.2.8 Political Desire

This is one of the new derived factors, and refers to the political role that is imposed on the case organisations. This can be realised from many aspects, the development of political conditions in the Kingdom of Bahrain, the commitment level from the Cabinet Office, and the ability of mid- and high-level management within the case organisations to support the e-government projects.

Empirical evidence elicited from the case studies indicated that the political development in Bahrain and its direct influence on internal political desires of government organisations, represented by commitment from top management, played a key role for the transparency, openness, flow, and publishing of government information to the public.

Therefore, many government organisations in Bahrain, as shown in Table 5.2, have achieved the first stage of the e-government growth model, which indicates progress towards e-government culture. Since information is a component of organisational power, if information flows from one location to another, this means a new arrangement of organisational power (Heeks and Davies, 1999). Previously, these organisations had been reluctant to disclose and share information due to concerns about power and security. Their reluctance had gradually changed over the last 5 years as a new generation had taken over the responsibility for IT and management positions, and political reforms in the last five years had encouraged the

transparency of governmental information which had affected these organisations to provide their information to the public.

In addition, as presented in Section 5.2, the Cabinet Office, represented by the Prime Minister, emphasised that government organisations should facilitate the delivery of their services to citizens by eliminating bureaucratic and organisational barriers, and through implementing e-government projects. The evident support from organisations' officials to open up e-government implementation had also motivated organisations' mid-level management employees to understand the value of e-government and believe that this initiative is part of the political development process in the country.

For example, in the CIO, the political role was clearly identified through the organisation officials' attitudes towards the success of the national smartcard project. The commitment of the Cabinet Office was dynamic through allocating a flexible budget that covers all IT and management requirements for the project. Consequently, the top management level includes the secretary, under-secretary and IT managers of the CIO, as discussed in Chapter 5, who give active support to the project by providing necessary resources to the working groups. In contrast, the political support from senior officials in the MOLSA to the e-government projects (e.g. Data warehouse) was unbalanced, which in turn made the implementation process move slowly. As discussed above, this factor, as represented in Figure 6.1, has a direct influence to the competition pressure, financial resources, and management process that can change the process of decision making within the case organisation.

6.2.3 Revision of Benefits-Barriers Model

Much literature (e.g. Dong, 2000; Iacovou *et al.*, 1995, Mehrtens *et al.*, 2001; Themistocleous and Irani, 2002) supported the view that perceived barriers and benefits are one of the most important factors affecting the adoption process of new IT projects in organisations. The results of empirical analysis confirmed this perspective in term of government organisations. The results of this research suggested that an awareness and understand of perceived benefits and barriers by organisation officials (i.e. IT and management staff) leads to help make a decision about adopting a certain e-government projects in organisation. As shown in Figure 6.1, this model consists of benefits factor which includes four categories and barriers factor which includes five categories. The following sub-sections will explain both factors.

6.2.3.1 E-government Benefits

This factor refers to the level of recognition of the relative advantage that e-government can provide to the organisation. Empirical data have shown that a mature organisation with management that recognises the benefits of e-government adoption was more inclined to adopt e-government projects than those whose management had a lower level of recognition of the perceived benefits, as reported in case organisations. Empirical results also indicated a positive relationship between perceived benefits and e-government adoption, as many authors presented in their research (e.g. Duffy, 2000; Heeks, 2001; James, 2000; National Research Council, 2002; Seifert and Petersen, 2002; Timonen *et al.*, 2002). In three case organisations, interviewees had shown the awareness of the benefits prior to the adoption, and confirmed that benefits were congruent with the adoption decision. For example, the MOLSA management evaluates the benefits of any IT projects, including those relating to e-government, before taking a decision to allocate budget or accede to a request for an additional budget from government. Many e-government projects (e.g. Data warehouse, Security) that need budget or approval from top management would be discussed with the IT managers, and common question asked was: What are the benefits returned to the organisation from implementing such a project? This was also obvious from interview with the Minister of the MOC when the former stated that the evaluation of e-government benefits was one of the determinants for allocating budget for e-government projects.

The empirical data derived from the analysis of case organisations suggested a validation of many of e-government benefits that were analysed from literature and reported in Chapter 2, and also derived new benefits. Table 6.3 shows a taxonomy of e-government benefits and highlights the new benefits that derived from case organisations, whereas Tables 5.6, 5.9, and 5.14 reported the findings that rank the importance level of benefits for each case organisation.

Category	E-government Benefits
Organisational	Improve internal management and support decision-making process
	Increase productivity of government organisations
	Allow organisation departments to do business more effectively
	More organised and effective business process
	Reduce layers and complexity within organisational processes
	Reduce workload of organisation's employees
	Improve quality and efficiency of data and services
Operational	Increase understanding of government rules and policies
	Improve accountability and transparency of government transactions
	Reduce amount of time spent on processing transactions
	Reduce communications costs between organisations
	Reduce maintenance cost of ICT tools and applications
	Develop new skills and motivations for government employees
Technical	Improve connection within and between organisations
	Enhance government ICT infrastructure
	Provide portability between systems and applications
	Improve and control the security of infrastructure and privacy of data
	Achieve process and data integration
	Increase reliability, consistency and accuracy of data sharing
	Reduce redundancy of data, applications and infrastructure
External	Digitising procurement services from and to business sector
	Increase collaboration with private sector
	Quick processing and response to citizens' needs and expectations
	Provide new (innovative) services to citizens and business
	Increase collaboration among public sector organisations
	Enhanced availability and transparency of government information to citizens

Table 6.3: Taxonomy of E-government Benefits with Highlighted New Benefits

6.2.3.2 E-government Barriers

The analysis of empirical data from all case organisations revealed that although there is an active commitment from top management in government, as shown in the speech of Prime Ministers (see Section 5.2) towards the adoption of e-government, and also high support from the organisations' officials for success of these projects, case organisations still struggle against barriers preventing full realisation of providing online government information and

services to constituents, as discussed in Sections 5.5.7, 5.6.6, and 5.7.7. This supports the initial findings from the e-government normative literature review discussed in Chapter 2 (e.g. Beynon-Davies, 2005; Beynon-Davies and Williams, 2003; Chen and Gant, 2001; Gefen *et al.*, 2002; Ho, 2002; Joia, 2004; Layne and Lee, 2001; Moon, 2002).

If the government in Bahrain desires to proceed to advanced stages of e-government adoption, it will need to overcome barriers that government organisations have experienced. As the literature indicated, barriers are degrading the performance of e-government implementation, preventing developers from modernising organisation structure and business process, and disallowing the real benefits of e-government to be shown to the public. The findings supported this perspective, and confirmed that the barriers factor was one of the most significant issues that influenced negatively on the e-government working groups, and then restricted the ability of case organisations' developers to proceed into higher stages of the implementation process. Consequently, many e-government projects remain under-developed and under-utilised, with little integration. For example, the MOLSA was experiencing a lack of effective support from organisation officials which, in turn, has repeatedly failed to acquire additional financial resources from government to support e-government projects. As a result, many e-government projects proposals were frozen in their initial implementation stages. In the case of the CIO, organisational culture also presented a critical barrier to the organisation, since some departments were reluctant to share their business data or processes with other departments within the same organisation or with external partners. They believed that connection or data sharing would be a threat to their power and then impact on their authority level. In addition, in the MOC case, the shortage of qualified IT workers was a concern of the organisation's management, and was ranked a significant barrier to the e-government implementation process. The shortage was due to the difficulty in attracting and retaining the right IT talent because of competition from the private sector which offered high salaries and attractive allowances.

The empirical data derived from the analysis of case organisations suggested a validation of many of e-government barriers that were analysed from literature and reported in Chapter 2, and also derived new barriers. Table 6.4 shows taxonomy of e-government barriers and highlights the new barriers that derived from case studies, whereas Tables 5.7, 5.10 and 5.15 reported the findings that rank the importance level of barriers for each case organisation.

Category	E-government Barriers
Organisational	Unclear vision and management strategy towards e-government
	Lack of coordination and cooperation between departments
	Lack of effective leadership support and commitment amongst senior public officials
	Complexity of existing business and management processes
	Absence of business rules and documentations
	Cultural issues
	Resistance to change
	Insufficient time and amount of work required to maintain e-government projects
	Political issues
	Resistance to share information and knowledge
IT infrastructure	Shortage of reliable networks and communication
	Inadequate network capacity or bandwidth
	Existing systems are incompatible and complex
	Lack of technical standards and common architecture policies, specifications and definitions
	Lack of integration across governmental systems
	Lack of knowledge regarding e-government interoperability
	High complexity in understanding the processes and systems in order to redesign and integrate them
	Lack of enterprise architecture
	Unavailability of e-government software, systems and applications
	Integration technologies of heterogeneous databases are confusing
Qualified Staff	Lack of IT training programme in organisation
	Shortage of well-trained IT staff in market
	Shortage of management skills staff
	Lack of employees with systems' integration skills
	No time for training staff with new technologies
	Complexity of government's recruitment process
	Shortage of salaries and benefits in public sector
	Flow of IT specialist staff
Operational Cost	Complexity of financial supply process from government
	Lack of financial resources in public sector organisations
	High cost of IT professionals and consultancies
	High cost of required hardware and software
	High cost of installation, operation and maintenance of e-government systems
	High cost of training and developing staff
Security and Privacy	Threats from hackers and intruders
	Threats from viruses, worms and Trojans
	Insufficient budget for security technologies and solutions
	High cost of security applications and solutions
	Unauthorised external and internal access to systems and information
	Lack of knowledge and vision for importance of security
	No assurance that transaction is legally valid
	Lack of security rules, policies and privacy laws
	Inadequate security level of government hardware and software infrastructure
	Absence of privacy of personal data
Lack of risk management security programme	

Table 6.4: Taxonomy of E-government Barriers with Highlighted New Barriers

6.3 Issues Learned and Recommendations for Case Organisations

The critical review of literature in conjunction with analysis experience of empirical data derived from the case organisations revealed many issues that can be addressed in government organisations in the Kingdom of Bahrain. This section presents issues learned from the case organisations and some recommendations for policymakers and public IT managers that help to address these issues in government organisations.

- From the interviews with IT managers and IT staff in three government case organisations, it has been noticed that a gap can arise between reality and the proposal of an e-government initiative. The reason for this is that the proposed e-government strategic plan prepared by the CIO had represented only the CIO perspective. There was no participation with other stakeholders such as department managers, government agencies, government staff, citizens and businesses during the setting of this e-government plan. Participation is widely cited as a critical success factor in any implementation of an IT innovation project. For example, Hirschheim *et al.* (1995) argued that success in the implementation of an IS project is contingent on the ability of the system to meet the expectations and needs of project stakeholders. Therefore, at least four roles should be present in the strategic plan and implementation process of e-government for collaboratory participation across organisational boundaries for cross-governmental and inter-sectoral information systems:
 1. Top managers with the power to allocate resources and have decisions implemented.
 2. IT staff across government bodies who can provide the necessary internal technical input and determine the requirements for e-government projects.
 3. Mainstream managers across government who work in sections and who will use the systems outputs.
 4. Citizens, business and government employees who will benefit from the e-government information systems.
- As findings revealed, government organisations have continued to implement e-government projects in isolation from one another and with minimal central management and coordination from the CIO, The latter's capacity to influence e-government

developments is limited, especially as it is devoting its resources to the implementation of the national Smartcard. This will result in a complex and disaggregated e-government information systems architecture. Therefore, there is a need for a central coordination body established by and followed up by the Cabinet Office to achieve IT strategy goals, central control, and progress monitoring of the e-government implementation process among government organisations.

- There is an extensive need for policy implementation and management as empirical evidence revealed that organisational barriers were not very significant in the first and second stages of e-government implementation compared with barriers in other stages. Hence, the Bahrain government may not need to consider drastic organisational changes; however, it is essential for the government to establish active leadership in order to implement information provision policies effectively, and to prepare for the advanced stages by avoiding barriers. Therefore, the Cabinet Office needs to establish, as discussed earlier, a government body and give it stronger authority for clear responsibility, performance measurements and follow-up during implementation of information provision policies. Further, policymakers in this organisation need to think about performance issues of e-government systems over a longer time and to pay attention to system sustainability. In addition, it may be beneficial to make partnership with industrial or non-governmental sectors for some complex areas, such as electronic system development and security, in which these sectors have more valid expertise than the government.
- Throughout the case studies, the researcher found no indications of initiatives in an evaluation policy for e-government implementation. Information technology evaluation was seen as one of the critical success factors in the sustainability of IT projects. The government should establish service standards with quantities targets for e-government, evaluate the performance of each government organisation activity based on them, and conduct follow-up measures for those lagging behind. Also, implement cost evaluation that shows not only the initial start-up costs (e.g. hardware and software) but also the operating, management, consultancy, and maintenance costs. In addition, it is necessary to develop evaluation measures for websites from the perspective of contents, design, usability, and so forth.

- Organisational structure and culture have an influential role in the ability of government organisations to build e-government IT projects. As a reminder of previous sections' outlines, culture and structure also contribute to resistance to change for political reasons. Therefore, the role of senior management is considered essential in this issue, since they can send strong signals about the importance of e-government projects to other stakeholders within the government organisation to involve them in the project process, build support, and then minimise resistance. For instance, information technology training courses could be one of the solutions provided to employees to educate them how to use computer systems and basic applications such as word processing and database applications. Another solution by providing internal presentations and workshops illustrating the benefits of automating some business operations and practices. It would be useful also that top management showing strong commitment to the usage of new business systems within the organisation and refusal to accept any excuses for not using the computer system in all business functions.

- As discussed in Chapter 5, the CIO is hosting the most active government information systems and applications (see Table 5.5), and also controlling access to the Internet. As a result, all government bodies in the country (e.g. ministries, governorates, municipalities, agencies and directorates) need access to government information which should be through the Government Data Network (GDN) architecture maintained by the CIO. This centralisation of government resources and integration of government applications might be more cost-effective than having a distributed environment, and also can facilitate the implementation process for the last stage (i.e. e-government integrated portal). However, to achieve reliable e-government integration among government systems, some ICT and related requirements need to be considered:
 - The interoperability process was maintained in a good manner in the CIO, but empirical data revealed that the CIO needs reengineering for its business processes. The reason for this is that case organisations encounter cross-organisational and business boundaries in government (see Chapter 5). In order to advance into the implementation process of e-government and develop efficient G-to-G interaction, the information sharing and collaboration need to be more traversed. This requires strong

relationship, trust, communication and cooperation between government organisations on one hand, and the CIO on the other, which is critical to integration.

- It is particularly important for the CIO to protect the privacy of the data in government databases and other information about citizens that it possesses. Policies need to be developed around collection of, access to and protection of personal information.
- Standards and protocols need to be established prior to data transmission across government organisations. Standards are required relating to who should have access to particular electronic records and how the latter should be formatted. Protocols should be established to ensure that the right data are available to the right people at the right time.

6.4 Conclusions

This chapter has concentrated on the revision and modification for the development of a proposed conceptual framework for e-government adoption. Validation and testing for each part of the proposed conceptual framework (stage of growth model, technology-organisation-environment model, and benefits-barriers model) have been discussed in this chapter, based on the empirical evidence presented, analysed and justified in Chapter 5.

Empirical evidence derived from the analysis of three case organisations, the CIO, MOLSA, and MOC, confirmed the applicability and validity of the revised framework in a wide range of government organisations in the Kingdom of Bahrain, and possibly in other similar countries because the validation of the proposed conceptual framework had been placed in different contexts among case organisations, such as the degree of maturity level for e-government adoption, nature of services provided by case organisation to constituents, and case organisation size. However, the central part of the revised framework which is the stage of growth model has been reformed. Hence, the implementation process of stages succession for this model has been restructured, and the functionality of Stage 4 has been changed. The findings also suggested that apart from the factors reported in the conceptual framework, new influential factors should be involved within the framework, which played an important role in the process of e-government adoption, namely management skills as part of competencies,

strategic partners, political desire, and management process. Further, the analysis of empirical data have shown that case organisation with management that recognised the benefits of e-government adoption was more promoted to adopt e-government than those whose management had a lower level of recognition of the perceived benefits. This provided evidence that benefits factor influence the process of e-government implementation. As well, the empirical results also indicated relationship between barriers and e-government adoption. This relationship showed that identified barriers are degrading the performance of e-government projects, preventing IT developers from modernising organisation structure, and reengineer business processes, consequently make the adoption process of e-government complicated and eliminating case organisations to provide electronic services and advanced end-to-end transactions.

Therefore, the empirical data validated the integrity of the conceptual framework and then supported the aim of this research that the revised framework would be effective tools for government organisations to support their decisions towards the adoption of e-government projects. This Chapter has highlighted that many information systems decisions for e-government in the case organisations are political and these decisions influenced by many aspects, such as political situation in the country, the level of commitment in the Cabinet Office, and the successful of previous IT projects. The empirical data revealed that strategic partners and alliances from private sector had filled the gap of IT infrastructure and competencies that existed during the implantation process of e-government projects, the case organisations would not succeed to achieve good progress without the support from partners. The findings also elicited new factor that used to be discussed in the private sector research, competition pressure. This factor played a key role in the case organisations to speed up the process of implementation and promote working groups to do their jobs based on systematic approach and specified timeframe.

The revision that held in this Chapter suggests that the empirical framework for e-government adoption would be comprehensive and suitable if it incorporate the following revised models:

- Stages of Growth model, which composed of four stages: Government information delivery, One-way service delivery, Two-way service delivery, and Integrated e-government portal. The implementation process of these stages could be done in parallel, such as Stage 2 and Stage 3.
- Technology-Organisation-Environment model, which includes IT infrastructure, Competencies, Organisation size, Financial resources, and Competition pressure.
- New Influential Factors, such as Strategic partners, Management skills, Political desire, and Management process.
- Benefits-Barriers model, which consists of benefits and barriers factors. Benefits factor is categorised as Organisational, Operational, Technical and External. Barriers factor is categorised as Organisational, IT infrastructure, IT skills, Operational cost, and Security and Privacy.

Chapter 7

Conclusions and Recommendations for Future Research

This chapter presents the main findings and conclusions derived from the literature analysis and the empirical research carried out. It also provides recommendations for future research in the areas of e-government. The chapter begins with an overview of the research findings and then discusses the contributions to the body of knowledge presented by the research. Limitations of the research and recommendations are then made for further research.

7.1 Research Overview and Findings

The emergence of e-government research has developed in the Information System (IS) literature over the last two years. The normative literature has predominantly focused on fundamental issues such as definitions, applications, benefits, and interaction of e-government initiatives. As a result, the adoption and implementation aspect of e-government has not been given adequate attention in the research literature leading to a number of voids exist. To date, the adoption of e-government has become an important strategic action plan for governments, since it is fundamental in modernising government business processes, as many IT managers believe that e-government adoption will increase efficiency, save money through increased centralisation of resources and economies of scale, and unify government IS applications.

However, many government officials have an incorrect stereotype that e-government is just setting up a server and posting web pages on it. The reason for this is that there is confusion among government officials about the concept and strategic objectives of e-government adoption. There is similarly a lack of awareness in government organisations surrounding the implementation process and critical factors that might influence the adoption of e-government. Consequently, many government organisations are still in the infancy stage of e-government implementation, since most of their websites are providing static information and services. Further, government organisations are struggling with the existing ICT infrastructure, since many of their IS applications are legacy systems and work under a mainframe environment. Also, these IS applications are not compatible with some e-government systems, which makes it difficult to interconnect them with front-end applications of government organisations websites, and hence automate and integrate the latter's business processes. Chapter 1 states the aim of this research, which is to *develop a frame of references that will outline the implementation process of e-government that identifies critical stages of implementation and influential factors that can be used to support the decision process in government organisations.*

In working to realise the aim of this research, Chapter 2 (*Background Theory*) started with a literature review and analysis by discussing the major aspects of e-government. Definitions from different perspectives (technological, political, and business), and motivations for e-government adoption have been explained. In this chapter also, a classification of e-government interactions have been analysed to identify the capacity of e-government

implementation among community sectors. The result of this analysis shows that e-government is a complex initiative because it affects many aspects of government, and many individuals and organisations. E-government is a relatively new research area, and its architecture and adoption strategy have not been widely discussed in the literature. Therefore, the researcher reviewed and studied these concepts from other relevant areas such as e-business, e-services, and e-commerce. Throughout a review of the normative literature and a comprehensive investigation in to e-government, it has been identified that there is a relative void existing in the aspect of e-government architecture in the public sector. Especially, in the implementation process and factors that influence the organisations. To understand the implementation process of e-government and its related issues, the researcher has developed a novel architecture framework that illustrates a technical and information management infrastructure that will support e-government adoption. This framework supports organisational business models and workflow through selecting the technology solutions and architecture layers that are most appropriate to e-government implementation requirements. The architecture framework, as presented in Chapter 2, is divided into four layers: access, e-government, e-business, and infrastructure layers. The access layer involves the channels by which government users can access the various services. The e-government layer discusses the approaches to improve these channels through integrating the digital data of different public sector organisations into a single government web-portal. However, this integration cannot be achieved without underpinning compatible and integrated information systems and applications. This underpinning can be done by incorporating an e-business layer that focuses on integration, coordination and interaction within and between individual systems in public sector organisations. It integrates front-end e-government layer applications with back-end activities to support the relationship and interaction of G-to-G and G-to-E. As a contribution involved with this framework, the researcher classified a selection of common applications and information systems, such as web services, EAI, ERP, CRM, and data warehouses that play a significant role in e-business layer architecture and, thereby, support the e-government operations. The final layer of this architecture is the infrastructure layer that provides a reliable foundation for the rest of the layers, such as access layer, e-government layer, and e-business layer. The purpose of the infrastructure layer is to offer the necessary standards and protocols through effective network and communication infrastructure technologies, such as intranet, extranet, and Local Area Network. In doing so, the researcher classifies these technologies to

describe their functionalities in the infrastructure layer, in particular, and to demonstrate their role within e-government architecture, in general.

Based on literature review and critical analysis, e-government benefits and barriers are presented in Chapter 2. This presentation addresses the confusion surrounding e-government in government organisations by providing a better understating of the implementation process. The significance of these factors is also that they are part of a proposed framework that influences the adoption of e-government. For the purpose of making a further contribution to the e-government literature, the researcher proposed taxonomy of benefits and barriers and categorised them into different dimensions. This taxonomy can be used to help support government officials in better analysis and evaluation of e-government projects before starting the actual implementation process.

In Chapter 3 (*Focal Theory*), the researcher analysed the normative literature in conjunction with researcher perspectives to establish a conceptual framework for e-government adoption. The author identified a gap in the literature, dealing with the absence of theoretical models for e-government adoption in public sector organisations. Therefore, the researcher, with support from the e-government architecture framework presented in Chapter 2, undertook an exploration of the adoption of e-government by analysing multiple models: (1) stage of growth models to propose an appropriate stage of growth model that can be used as a central part of the proposed conceptual framework for e-government adoption. However, the stage of growth model is not a sufficient model for e-government adoption, and there is a need for another framework that can explain the significant factors that influence the adoption process in the public sector, and support the implementation of each stage. Therefore, the researcher integrated the proposed stage of growth model with (2) the Technology-Organisation-Environment model. In addition to these models, a third model has been incorporated, which is (3) the Benefits-Barriers model. These models collectively result in a novel comprehensive framework for the adoption of e-government in the public sector (see Figure 3.1). The researcher believed that the proposed stage of growth model is flexible for an organisation to adopt, regardless of its electronic service delivery maturity. Further, each successive stage raises the strategic potential of ICT. The researcher proposed four stages that characterise the adoption of the stage of growth model. These four stages are (1) government information delivery, (2) one-way service delivery, (3) two-way service delivery, and (4) government integration. The value of this stage of growth model is in providing a roadmap for

understanding the evolution of e-government in public sector organisations. This can help organisations understand the implementation process and provide guidance on how to move towards realising the potential of e-government. The proposed conceptual framework was then empirically validated and revised in Chapters 5 and 6 of this dissertation.

To select the research method and process to be followed to achieve the aim of this research, Chapter 4 (*Data Theory*) has been used to identify the research strategy, research design, research approach, data triangulation, unit of analysis, and research protocol. In this chapter, the research methodology was developed and adopted, supported by justifying the selection of a qualitative research approaches to collect data from the public sector. The research strategy was also identified, which was a multiple case study to investigate the e-government adoption process, since in general it provides the researcher with the opportunity to investigate the government organisations' information systems in depth through a series of interviews, document analysis, and observation.

Chapter 5 applied what previous chapters reported about the research aim and objectives through the use of a case studies protocol in three case organisations. This chapter focused on the process of analysis and investigation of case organisations. Empirical data have been presented in depth on the three case organisations in the Kingdom of Bahrain, namely the Central Informatics Organisation (CIO), Ministry of Commerce (MOC), and Ministry of Labour and Social Affairs (MOLSA). The chapter began with investigations of the e-government phenomena in Bahrain, and reported that political development in the country in the last 5 years played a key role towards the adoption of e-government through transparency and openness of government information. Therefore, the researcher attempted to measure the maturity level of e-government across different government organisations in the country. In doing so, substantial parameters and evaluation criteria have been proposed to form a novel evaluation framework. This framework was used as a tools to analyse e-government portals of key government organisations headed by the Cabinet Office, which provide active and direct services and information to citizens and businesses, such as the Ministry of Commerce, Ministry of Health, Ministry of Labour and Social Affairs, Ministry of Education, Ministry of Municipalities, Central Informatics Organisation (CIO), and Civil Service Bureau. The evaluation results revealed that most of the organisations are situated between the first and second stages of the stage of growth model for e-government proposed by the researcher. Only

a few government Ministries, notably those concerning business regulations have progressed into the third stage. The three case organisations had reached a different stage of maturity: the CIO was in Stage 1, the MOLSA had moved into Stage 2, and the MOC is the only government organisation to meet the entire requirements of Stage 3.

According to the empirical data derived from these case studies, the proposed conceptual framework which consisted of the stage of growth model, the Technology-Organisation-Environment model, and the benefits-barriers model, was appropriate for the research context, the Kingdom of Bahrain, since these models components were precisely identified by the researcher as influencing the process of e-government adoption in all case organisations. However, empirical evidence has indicated a number of modifications to the proposed conceptual framework. These findings were considered in Chapter 6, where entire parts of the conceptual model have been revised (see Figure 6.1). The major outcomes will be explained in next Section 7.1.1.

7.1.1 Research Outcomes

The major outcomes derived from this research are summarised below:

- Reviewing the normative literature in the e-government area and in the information systems area in general, revealed an absence of theoretical models that portray the implementation process of e-government. The reason for this is mainly that e-government is a relatively new research area, and the strategy of adoption has not been widely discussed in the literature. Hence, there was a void existing in the aspect of an e-government adoption framework in public sector organisations. This led the researcher to review and analyse these aspects from other relevant areas such as e-business, e-services, and e-commerce
- Literature analysis, in conjunction with empirical data, reported that the adoption of e-government is not straightforward since e-government is a far reaching strategy that affects many aspects in organisation. Hence, it requires an integrative architecture framework approach with organisations going through a number of stages before they can fully realise the predicted benefits, and place government information and services online. This is a reason of why many government organisations are still in the infancy stage of e-

government adoption. Another important reason for this delay also is that e-government requires significant changes in organisational infrastructure, which, in turn, can engender resistance what the researcher calls barriers, in this research.

- A conceptual framework has been proposed to address the voids in the literature regarding e-government adoption. This framework has then been empirically validated and modified to contribute a novel conceptual framework for the adoption of e-government. All integrated parts of this framework have been tested (e.g. stage of growth model, technology-organisation-environment model, and benefits-barriers model), and empirical evidence suggested to restructure the implementation process of the stage of growth model and incorporate new influential factors in the framework. Hence, the framework integrates ten influential factors for e-government adoption, namely: (1) IT infrastructure; (2) Competencies which consists of two dimensions: (a) IT skills and (b) Management skills; (3) Strategic partners; (4) Organisation size; (5) Competition pressure; (6) Financial resources; (7) Management behaviour; (8) Political desire; (9) Barriers, and (10) Benefits.
- Based on empirical data, a novel taxonomy has been generated for the barriers and benefits. The findings from the analysis of case organisations suggested a categorisation for e-government barriers and benefits according to their nature, and also extending a classification proposed by Shang and Seddon (2000). The latter proposed a model to classify the barriers and benefits derived from IT infrastructure such as ERP and EAI. This model is considered adaptable for the classification of e-government benefits and barriers, since the main purposes of e-government adoption are to automate business processes and integrate IT infrastructures in public sector organisations. For example, barriers had been categorised into (a) organisational, (b) IT infrastructure, (c) IT skills, (d) operational cost, and (e) security and privacy. In addition, benefits had been categorised into (a) organisational, (b) operational, (c) technical, and (d) external.
- It is empirically tested through the case studies of the CIO, MOLSA and MOC that the e-government architecture framework proposed in Chapter 2 to illustrate technical and information management infrastructure supported the validation process of the conceptual framework of e-government adoption, especially in the perspective of ICT infrastructure.

As well as this framework, as the empirical data reported will help the decision-making process in government organisations when they plan to adopt e-government.

- It has been found that the maturity measures proposed in Chapter 5, which includes evaluation parameters and criteria, was appropriate tool to analyse e-government portals that can be used as an evaluation framework which determines the degree of progress already made by an organisation towards e-government implementation. This framework helped to evaluate the maturity level of e-government portals in government organisations. The evaluation is based on stage of growth model proposed by the researcher associated with parameters extended from the literature which allow identifying the adoption stage of e-government, such as Stage 1, Stage 2, or Stage 3 (see Table 5.1).
- The researcher studies three government organisations located in the Kingdom of Bahrain as multiple case studies, the Central Informatics Organisation (CIO), the Ministry of Social Affairs and Labour (MOLSA), and the Ministry of Commerce (MOC), since they provided sufficient information for this research, and a fourth would not have contributed further significant data. The selection of these organisations is based on three different contexts namely, level of interaction or nature of services provided (e.g. G-to-G, G-to-B, G-to-C), organisational size (e.g. small, medium, large), and maturity stage of e-government implementation (e.g. Stage1, Stage 2, Stage 3). Using three different case studies provides more powerful and robust conclusions in this research through confirm the validity of the revised framework in a wide range of government organisations in the Kingdom of Bahrain.

7.2 Research Novel Contribution

The contribution of above outcomes led the researcher to propose novel contributions in the area of e-government in this dissertation. In addressing the void in the literature regarding e-government adoption, and developing an empirical framework that outlines the implementation process in government organisations, the researcher proposed and then empirically confirmed three particular novel contributions.

- 1. A Novel Framework for E-government Adoption.** This concerns the central contribution of this research based on empirical work that provides a comprehensive implementation structure for e-government in the public sector (see Figure 6.1). This framework integrated a set of models, namely the stage of growth model that portrays the e-government roadmap of the implementation process, technology-organisation-environment model, and benefits-barriers model. This framework seeks to reduce the confusion surrounding the e-government adoption process in the public sector by understanding the implementation process, identifying the requirements of ICT tools, highlighting the importance of the organisational readiness and the impact of the environment. The framework can also help the decision makers' level to set a vision statement and strategic action plan for the future of government in the IT age by identifying key factors and stages for action. In addition, the proposed framework will allow the IT specialists to understand and evaluate the maturity of their e-government projects. In doing so, the outcomes of this framework help to identify evaluation parameters that can be used to measure the progress level of e-government portals. As presented in Table 5.1, these parameters in conjunction with the literature proposed evaluation model that can be benefited to determine the existing adoption stage of a government organisation based on four-stage model proposed by the researcher.
- 2. E-government Architecture Framework.** This is another important contribution in this dissertation since there was an absence of literature regarding the ICT requirements, appropriate integration technologies, and infrastructure mapping for e-government. The empirical evidence verified the application of this framework because it supported the understanding of the e-government implementation process in government organisations. This framework, as presented in Figure 2.3, was based on a critical analysis of literature, extended by the researcher to become an integrated architecture framework for e-government that represents the alignment of IT infrastructure with business process management in public sector organisations. The researcher also incorporated integration applications and interaction tools. The reason for this is that they already play a significant role in enhancing the business process within organisations and their applications such as e-business, e-commerce, EAI, web services, etc., so their inclusion was considered necessary. This framework can help IT practitioners in the public sector to learn how to use and manage information

technologies to revitalise business processes, improve business decision making, and gain competitive advantage from the adoption of e-government. This framework also had helped the researcher to build the conceptual framework in Chapter 3 and mapped the interview agenda by providing the clues of e-government implementation process, identifying the ICT requirements, portraying the IT infrastructure, and highlighting the significance of integration and relevant applications.

- 3. A Novel Taxonomy for E-government Barriers and Benefits.** Although the literature has indicated theoretically the barriers of e-government and the benefits of its adoption, the contribution of this research has been to validate both barriers and benefits through the analysis of empirical data derived from case organisations and then to propose a novel taxonomy. The findings confirmed some of these barriers and benefits proposed in Chapter 2, and also derived new barriers and benefits as indicated in Chapter 6. Therefore, the researcher updated the classification presented in Chapter 2, and categorised barriers and benefits based on their contexts and level of importance for each case organisation (see Chapter 5). These taxonomies, as presented in Tables 6.3 and 6.4, can be used by organisational decision makers when considering the adoption of e-government, and allow the IT managers and researchers to better analyse and explore the implementation aspects of e-government.

7.3 Research Limitations

The framework presented in Chapter 6 represents the start of research in the e-government adoption area. It can be used as background theory for researchers. However, the proposed research is confined to the limited geographical area where it has been conducted and the small number of government organisations interviewed. It might be therefore difficult to generalise from these results to other regions of the world. The research does however give an image of what the context is in Bahrain and highlights some issues that could be used by decision makers and IT specialists in implementing e-government.

As presented in Chapter 4, the research approach for this study was qualitative, since e-government adoption is a little-known phenomenon, and this allowed the researcher to

understand and examine in depth the adoption processes, determine existing adoption stages, and identify future strategies for the evolution of e-government through detailed interviewing and observation. In addition, qualitative research methods facilitate generalisation of soft, rich contextual data, which is associated with human and organisational issues. However, these methods do have inherent limitations, such as being time consuming in that the researcher spent a great deal of time involved in the process of data collection and analysis. The amount of data collected through three cases was more contextual. This made the interpretation difficult and presentation of the analysis process in Chapter 5 hard to achieve without some degree of bias. Also, there is much concern about the degree to which qualitative research can be generalised outside the confines of the investigation, especially when the sample of case organisations is relatively small. Although the number of case organisations investigated in this research was three, raising the sample size would not increase its external validity.

The restricted access to data, and in particular government documents, in the case organisations was considered one of the concerns in this research. In some instances, interviewees were not able to reveal everything regarding the budget, financial constraints, relationship with senior managers, and problems with top management. Also, appointments with some managers were repeatedly cancelled or postponed. As a result, the process of collecting data and studying the organisations was heavily time-consuming. However, in one of the case organisations, the researcher was enabled to interview the Minister who was asked for further interviews with e-government working groups; this important meeting opened some doors in the organisation for further data collection.

In addition, through the interviews with IT managers in the case organisations, the researcher found that directors and managers were reluctant to reveal problems or negative aspects about their projects. It was felt that this could create an unfavourable impression, and hence they repeatedly discussed the good aspects. Therefore, the researcher changed the interviewee level from executive management to middle and lower management, since these employees were more likely to be directly involved and affected by the implementation process in the organisation and to be willing to disclose problems. Also, to address this limitation, the researcher used data triangulation to collect data from various sources.

7.4 Recommendations for Further Research

The following recommendations are made for further research:

- The development of a framework for e-government adoption was based on three case organisations located in the Kingdom of Bahrain. This context is characterised by a small geographical area, relatively low population, and single government level, since there are no multiple levels of government such as central, city, or local. Therefore, the researcher recommends validating this framework in different contexts such as in a bigger state or at multiple government levels, to extend the generalisability and contribution of this framework.
- It would be informative to propose framework for information systems evaluation to complement the information system development, projects management, and implementation functions. This will allow government organisation to know how to evaluate their information systems associated with e-government. It will also identify the cost for e-government adoption in the public sector, and this cost can be viewed as direct and indirect cost.
- Through shortage of time and resources, the researcher was unable to test all available factors in the literature that could influence the implementation process of e-government. Therefore, it would be an important proposition to study further organisational factors, such as human resource quality, centralisation, formalisation and slack resources, and also environmental factors, such as consumers' readiness to identify their significance. It would be useful to retest factors identified in this research in different contexts and determine if they have the same impact or are less significant. These factors also can be classified into two categories, critical success factors or critical failure factors.
- A further recommendation is to develop a model that can address the management changes within a public organisation as a result of e-government adoption. It is obvious that e-government affects many aspects within the government organisation, and then the reengineering of business and management processes and activities become

necessary for the e-government projects to succeed. Developing a model that illustrates the managerial phases that should be presented in public sector organisations during the implementation of e-government will improve analysis in this area and contribute to better decision-making.

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Appendix A

Organisational Adoption Theories

Many research in IS literature examines IT adoption on the individual unit of analysis by empirically testing the relationship between constructs such as perceived usefulness, perceived ease of use, and other external moderating variables.

This technology adoption and diffusion research converges on traditional theoretical framework that seeks to explain the individual target adopter attitudes, intentions, and behavior concerning the technology. Among these are Diffusion of Innovations (Rogers, 1983; 1995), the Theory of Planned Behavior (Ajzen, 1985; Taylor and Todd, 1995), the theory of Reasoned Action (Fishbein, 1979), the Technology Acceptance Model (ATM) (Davis, 1989), and Social Cognitive Theory (Compeau and Higgins, 1995). Although it is beyond the scope of this work to describe all of these models, one that has received the most attention in the IS literature is reviewed briefly: Davis's Technology Acceptance Model (TAM), which focus on behavioral aspects of IT innovators. Simply stated, TAM contends that the sole determinant of use of technology is the intention of the user, which is based on perceptions of the ease of use of the technology and its usefulness. Usefulness incorporates the capability to be used advantageously. A major theoretical limitation is TAM's exclusion of the possibility of influence from institutional, social and personal control factors.

While useful in discerning the factor that attributes to human intent, one has difficulty in applying these frameworks in an organizational setting. Contemporary studies suggest that these traditional frameworks are not effective in studying the antecedents to implementing technology innovations within organizations level since they neglect the realities of implementation technology innovations within organization. The reason for that is the adoption decisions are made at the organizational, division, or workgroup level, rather than at the individual level. In addition, some classical variables do not map cleanly to the organizational level of analysis due to implementation complexity. Moreover, the

organizational adoption of an innovation is not typically a binary event, but rather occurs as a series of events over time which some studies call it the innovation adoption process (Cooper and Zmud 1990; Fichman, 1992; Fichman and Kemerer 1997; Gallivan, 2001).

Accordingly, there is a need for adoption theory that addresses the stages the organization goes through to learn about an innovation and adopt it. For instance, Zaltman et al., (1973) suggests two basic stages for organizational adoption, initiation and implementation. The adoption decision occurs between the initiation and the implementation stage. In the initiation stage, the organization becomes aware of the innovation, forms an attitude towards it, and evaluates the new product; it encompasses awareness, consideration, and intention sub stages. In the implementation stage, the organization decides to purchase and make use of the innovation. However, this organizational adoption decision is only the beginning of implementation. The acceptance or assimilation within the organization now becomes important. From a supplier's perspective, the innovation process can only be considered a success when the innovation is accepted and integrated into the organization and the target adopters demonstrate commitment by continuing to use the product over a period of time (Bhattacharjee, 1998, Ram and Jung, 1991; Rogers, 1995). This is consistent with Rogers (1995, p. 21), who defines adoption as “. . . the decision to make full use of an innovation as the best course of action available.”

Numerous adoption models were proposed in the normative literatures for the adoption of IT innovations such as Rogers(1995), Ling(2001), Nolan(1973), Thong(1999), Iacovou et al. (1995) and Davis(1989). One of the empirically tested models by a number of studies (e.g. Zhu *et al.* 2002, Chau and Tam 1997, Scupola 2003, Kuan and Chau 2001 and Ang *et al.* 2001) on various IS domains such as e-commerce, e-business and EDI adoption is Technology-Organisation-Environment model by Tornatzky and Fleischer (1990). Since e-government is a new research area, no many literatures have been found during the literature review. Therefore, there is absence of theoretical model for e-government adoption, despite there are some stages of growth models proposed by several studies (e.g. Baum and Di Maio 2000, Wimmer *et al.* 2002, Moon 2002, Deloitte Research 2000, McDonagh 2002, Bonham *et al.* 2002) no one of these have been empirically tested except Layne and Lee (2001) argued that staged model is developed based on their observations and experience with e-government

initiatives in the USA. In addition, some models have been used for adoption of other area (e.g. e-commerce, e-business, and ERP).

In organizational-level process and stage research models, it is not technology use or user adoption per se that matters as the outcomes of interest, but rather how extensively the innovation is used and how deeply the organization use of the technology alters processes, structures, management, and organizational culture. Some studies have generally referred to this notion as the innovation's degree of assimilation into the organization, or assimilation stage (Meyer and Goes, 1988; Fichman and Kemere, 1997). Assimilation may be divided into two sub-constructs: breadth and depth of technology use. Breadth of use refers to the number of adopters within an organisation, while depth of use is less tangible construct describing how extensively the innovation is used and its level of impact within the organization (Gallivan, 2001).

Appendix B

Interview Agenda

The interview agenda will be used to collect the primary data from the interviewees personally during both interview type, structured and semi-structured. *The agenda will not be given to the interviewees rather than the questions will be demonstrated and explained to them by the researcher and then will be filled by the researcher to verify the accuracy and validity of answers.* The agenda will keep the researcher in the scope of research topic and steer him into the research direction that the interview should cover during the interview process. The data collected from the interview will be tape recorded and transcribed on a later time.

The questions in this agenda are mapped as a combination of *closed-ended questions* and *open-ended questions*. Closed-ended questions limit interviewees' answers to the interview. The interviewees are allowed to choose from either a pre-existing set of dichotomous answers, such as yes/no, true/false, or multiple choice with an option for "other" to be filled in, or ranking scale response options. While the Open-ended questions do not give interviewees answers to choose from, but rather are phrased so that the interviewees are encouraged to explain their answers and reactions to the question with a sentence, a paragraph, or even a page or more, depending on the interview question.

The interview agenda is divided into three parts; all parts treat certain dimension of the research and acting as a comprehensive agenda for each case study.

The questions aimed to address the following issues:

- To gather information about the IT/IS infrastructure in the case organisation
- To identify the organisation business process toward e-government adoption
- To investigate the implementation process of e-government within the organisation
- To identify the benefits and barriers for e-government adoption

Interviewee Details:

Organisation Name			
Interviewee Name			
Interviewee Position			
Department			
Telephone No.		E-mail	

Questionnaire Index

Section A	IT/IS Development in organisation
Section B	Organisation Business Process
Section C	The Practice of e-government implementation

Section A	IT/IS Development in organisation
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A.1 How is your IT infrastructure organised? Describe the major role of your IT infrastructure in your organisation. For example, WAN, LAN, intranet, Extranet, types of servers, compatibility of systems and applications, etc.

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A.2 How many information systems/applications do exist in your organisation? What are they, and how are they supported your e-government project? Please state do they support e-government implementation in your organisation.

	Information system/ application	Functionalities	Support e-government (Yes/NO)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

A.3 Does the organisation have intranet-based communication as a part of IT infrastructure?

YES	
NO	

If YES, how important are the following intranet benefits to your organisation process and operational procedures: (*Indicate all that apply*)

Intranet Benefits	0	1	2	3
Improving the communication and coordination between employees within the organisation				
Enhance the quality of decision making process in the organisation management				
Empowerment the government data access and knowledge sharing at all levels in organisation				
Reduce the costs and time of content development, duplication, distribution and usage				
Other:				

A.4 Do you have a DBMS in your organisation that manipulate your local data and records?

YES	
NO	

If YES, how is it compatible with Internet-based applications which your organisational data and records can be provided to the public though web site. Please describe.

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A.5 Do your organisational top management has a clear vision and realise the significant of security systems that should protect IT infrastructure and the organisation e-government website?

- A. Top management has a clear long term vision of the significant of security systems and the technology required for IT infrastructure and website protection
- B. Top management somewhat pays attention of security issues in organisation but still not fully realised the significant of security technologies to protect IT infrastructure and website
- C. The security issues and technology is completely new to the top management so they have not clear vision for the significant of security and website protection
- D. Top management pays no attention for IT infrastructure security and the organisation website contents protection

A.6 How you would describe the security systems for the IT infrastructure in your organisation:

- A. Reliable security systems have been configured to IT infrastructure and organisation e-government website
- B. Somewhat reliable systems that protect the IT infrastructure but they need more adjustments and new protection technologies for organisation website
- C. Unreliable security systems and experiencing of many security holes in the IT infrastructure and lack of necessary technologies for protecting the organisation website contents
- D. Other:

A.7 What are the security technologies and approaches that your organisation has applied to protect the IT infrastructure and the website contents? (*Indicate all that apply*)

Tick Here	Security Technologies
	Public Key Infrastructure (PKI)
	Biometrics systems
	Intrusion Detection systems
	Smart Cards
	Digital Certificate
	Firewalls
	Other:
	Other:

A.8 What is your current integration infrastructure? Which of the following integration approaches have been implemented in your organisation? (*Indicate all that apply*) Describe their functionalities and how they support your organisation IT infrastructure.

Please identify how important are they for the adoption of e-government

Integration approaches	Tick Here	Functionalities	0	1	2	3
Electronic Data Interchange (EDI)						
Enterprise Resource Planning (ERP)						
Enterprise Application Integration (EAI)						
Web Services						
Data Warehousing						
Document Management Systems						

A.9 How would you describe the IT infrastructure progress in your organisation?

- A. Very good progress since there is a strong IT engineering orientation and a lot of in-house IT expertise in organisation
- B. Somewhat proper IT infrastructure progress since the growing utilities and requirements of organisation can not be met immediately
- C. Slow progress since the lack of commitment and support from top management, lack of in-house IT expertise and shortage of necessary funds make the implementation of certain project pass through complicated procedures and hence confuse the achievements of that projects
- D. Other.....

A.10 How would you describe the maturity and readiness of the IT infrastructure for the implementation of e-government in your organisation:

- A. The maturity level of IT infrastructure is high and being formed to employ e-government required technologies and applications
- B. The IT infrastructure is somewhat mature but for early phases of e-government implementation (e.g. creating website, publishing static information) since the functional and performance of IT infrastructure is incomplete which limits actual use of some application such as integration, payment, and online database.
- C. The IT infrastructure is not mature enough for e-government implementation process since some existing applications and systems require expensive custom of configuration

A.11 What are the key problems of IT infrastructure in your organisation that will impact negatively the implementation of e-government: *(Indicate all that apply)*

- A. Integration problems (e.g. integrating data residing in multiple databases throughout the organisation, connecting the applications and processes within and between organisation departments)
- B. Middleware applications infrastructure problems
- C. Unreliable networks and communication infrastructure
- D. The required technologies and applications for e-government implementation are not compatible with existing applications and systems in organisation due to their complexity
- E. Other:

A.12 How would you describe the qualification level of IT staff in your organisation:

- A. IT employees are strongly qualified to support IT applications and systems and they capable to treat all complex situations and needs from organisation
- B. IT employees are qualified but for a particular systems and applications and they incapable to maintain some sophisticated technologies such as middleware technologies, database oriented, transaction oriented, and message oriented
- C. Most of IT employees in organisation are not qualified to deal with IT applications and systems problems, configuration, and development as well as network engineering and management
- D. Other:

A.13 How would you describe the IT training strategy that has been applied in your organisation:

- A. We have a clear vision for the importance of training strategy and top management support this vision and understand the needs of such training courses for organisation staff
- B. We have set a training strategy plan for the organisation but not completely follow it due to lack of support form top management and employees
- C. We have not set a training strategy plan in organisation
- D. Other:

Section B	Organisation Business Process
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B.1 Who initiated the idea of adopting e-government in your organisation?

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B.2 How is the support level from top management in your organisation toward adoption of e-government?

- A. There is active commitment and support from top management who pushed toward adoption of e-government and able to provide the necessary funds
- B. There is somewhat commitment and support from top management to the adoption of e-government and it is not sufficient throughout the process of implementation
- C. In most cases the top management pays no attention to the adoption process of e-government
- D. There is no commitment and support from top management to the adoption of e-government and sometimes they restrict the process of implementation

B.3 Do you believe that the e-government cost has *direct* influence to the process of e-government implementation in your organisation? Describe how.

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YES	
NO	
I don't Know	

B.4 What are the main costs associated with adoption of e-government in your organisation?
 (Indicate all that apply)

E-government Costs	Not important		very important	
	0	1	2	3
Hardware and software costs				
Implementation cost for subsequent applications and tools				
Maintenance Cost				
Consultancy cost				
Staff training cost				
Management efforts cost				
Other:				

B.5 Do some government organisations-which have performed reasonable progress in e-government- impact your organisation decisions toward accelerating the implementation of e-government in order to remain competitive? Please justify.

YES	
NO	

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B.6 Do you believe that the benefits deriving from e -government have *direct* influence to your organisation decision making toward adoption of e-government?

YES	
NO	

B.7 What are the benefits derived from e-government adoption in your organisation? (*Indicate all that apply*)

Not
ImportantVery
Important

E-government expected benefits	0	1	2
Improve management and support decision making process			
More organised government business process			
Allow organisation to do businesses more effectively			
Increase collaboration among other public organisations			
Increase collaboration among other private organisations			
Increase organisation productivity			
Reducing operations cost of services delivery and communications between government and citizens, business and employees			
Improve the connection within and between organisations			
Enhance the ICT infrastructure			
Increase the exchange of data between organisations			
Improving the efficiency of government services			
Quick processing and response to citizen's needs and expectations			
Developing new skills and motivations for employees			
Digitising procurement services from and to business sectors			
Reducing amount of time spent on government services delivery			
Other:			
Other:			
Other:			

Section C The Practice of E-government Implementation

C.1 When did you start the *first phase* toward the adoption of e-government?

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C.2 How did you start the first *empirical phase* of e-government implementation in your organisation? (*Indicate all that apply*)

- A. Generate a website that contain information about the organisation
- B. Connect the organisation departments with each other through intranet
- C. Establish data and process integration with other public organisations
- D. Other:

C.3 Who was involved in the implementation process of e-government?

- A. Implementation entirely done by the suppliers/ outsource contract
- B. Implementation is co-makership with the supplier
- C. Implementation entirely done by in-house IT staff
- D. Other:

C.4 Have your organisation set a strategy plan for e-government adoption? Does this plan draw the strategic framework for e-government adoption? Who set this plan?

Copy can be provided.

YES	
NO	

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C.5 How would you look at the progress of e-government implementation in your organisation:

- A. Very good progress since there is a strong motivation from top management and organisation employees to offer necessary administrative facilities and provide funds to purchase essential IT tools for e-government
- B. Somewhat proper e-government progress as the growing utilities and requirements of e-government can not be met immediately which suspend the implementation process and hence delay the termination of a certain implementation phase
- C. Slow progress since the lack of commitment and support of top management, lack of in-house IT expertise and shortage of necessary funds make the implementation of e-government pass through complicated procedures and hence confuse the achievements of e-government projects
- D. Other

C.6 What is your future strategic actions for e-government implementation in your organisation? (*Indicate all that apply*)

Future Strategic Actions	0	1	2	3
Expand the existing IT infrastructure in the organisation				
Strengthen the security systems of e-government website by installing new protections technologies and approaches to provide secure transactions				
Incorporate advanced IT features and tools to the e-government website such as online payment system, online customised public profile, data transfer technology, and electronic records and knowledge management				
Generate citizen interactive conversations area through e-mail systems or online forums with constituents or government officials				
Focus into the integration issue by connecting data, processes and applications between government organisations				
Other:				

C.7 What are the key features or functionalities that included in your e-government portal?
 (The aim of this question is to determine the existing adoption stage)

E-government portal functionalities	Stage 1	Stage 2	Stage 3	Stage 4
	Government Information Delivery	One-way Service Delivery	Two-way Service Delivery	Government Integration
General information about organisation services				
Organisation mission statement				
Information about departments				
Organisation mailing address				
Organisation telephones directory				
Organisation News and Events				
Organisation Chart				
External News and Statistics				
Links to other government organisations				
Links to other private organisations				
Search Engine for site contents				
Contacting e-mails addresses for government officials				
FAQ window				
Downloading application forms				
online public forums				
Databases connected to organisation website				
Provides online transactions				
Payment processing Engine				
Registration form for user				
Security tools and technology				
Maintaining user profiles				
Interchanging results of online transactions between organisations systems				

C.8 How important are the following stages for e-government adoption in your organisation? Do you believe that the proposed four stages are not sufficient for map the growth of e-government in your organisation? If yes, can you suggest other necessary stages for e-government adoption in the following table? (If they are not sufficient)

Sufficient	
Not Sufficient	

Stage	Proposed Adoption Stages	0	1	2	3
1.	Government Information Delivery				
2.	One-way Service Delivery				
3.	Two-way Service Delivery				
4.	Government Integration				
	Other:				
	Other:				
	Other:				
	Other:				

C.9 Do you agree that the proposed stages sequence of e-government implementation is the most appropriate sequence?

- A. Agree, because there is no better sequence than the proposed sequence
- B. Somewhat agree, because it looks not consistent and it need restructure
- C. Not agree with the proposed sequence, please number what is the proper sequence you suggest in the following table:

Stage	Proposed Adoption Stages Sequence	Your sequence
1.	Government Information Delivery	
2.	One-way Service Delivery	
3.	Two-way Service Delivery	
4.	Government Integration	

C.10 What is the most complex stage for e-government implementation? In what implementation stage you face the most complicated problems and challenges that were confuse the implementation process. For example, restrictions form management, luck of necessary IT tools and software, insufficient fund support, and lack of high IT expertise. Please rank the stages according to their complexities level. (0 = easy and straightforward stage without any problems, 1 = somewhat complex stage with minor problems, 3= complex stage, 4= very complex stage). Please justify you answer.

Stage	E-government Adoption Stages	Complexity Level
1.	Government Information Delivery	
2.	One-way Service Delivery	
3.	Two-way Service Delivery	
4.	Government Integration	
	Other:	
	Other:	

Justifications:

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C.11 According to the proposed implementation stages, can your organisation IT staff work and employ into two implementation stages at the same time, or it is essential to terminate from one stage and then start with *next* stage? Please justify.

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C.12 What are the barriers to e-government adoption in your organisation? Please specify the barriers for each adoption stage independently

Barriers to adoption stage-1 (Government Information Delivery)				
	0	1	2	3
ICT infrastructure				
Unreliable networks and communication				
Inadequate network capacity or bandwidth				
Existing systems are incompatible and complex				
No integration across internal systems				
Existing internal systems have restrictions regarding their integrating capabilities				
Unavailability and incompatibility of necessary software, systems and applications				
Integration technologies of heterogeneous databases are confusing				
Lack of documentation especially in the case of custom systems				
Other				
Other				
Security and Privacy Issues				
Threats from hackers and intruders				
Threats from viruses, worms and Trojans				
Unauthorised external and internal access to systems and information				
Lack of security rules, policies and privacy laws				
Inadequate security of government hardware and software infrastructure				
High cost of security applications and solutions				
Lack of risk management security program				
Unsecured physical access to building or computers rooms				
Lack of knowledge for security risks and consequences				
Other				
Other				

IT skills				
Lack of IT training programmes in government				
Shortage of well-trained and qualified IT staff in market				
Developing web site by unskilled staff				
Unqualified project manager				
Lack of employees with integration skills				
Shortage of salaries and benefits in public sector				
No time for training IT employees				
Flow of IT specialist staff				
Other				
Organisational Issues				
Lack of coordination and cooperation between departments				
Lack of effective leadership support and commitment amongst senior public officials				
Unclear vision and management strategy				
Resistance to change form management and employees				
Complexities of existing business processes				
Culture and politics issues				
Other				
Operational Cost				
Insufficient of supply come from central government				
High cost of IT professionals and consultancies				
High cost of hardware and software				
IT cost is high in developing countries				
High cost of installation, operation and maintenance of e-government systems				
High cost of training and system development				
Other				

Barriers to adoption stage-2 (One-way Service Delivery)				
	0	1	2	3
ICT infrastructure				
Unreliable networks and communication				
Inadequate network capacity or bandwidth				
Existing systems are incompatible and complex				
No integration across internal systems				
Existing internal systems have restrictions regarding their integrating capabilities				
Unavailability and incompatibility of necessary software, systems and applications				
Integration technologies of heterogeneous databases are confusing				
Lack of documentation especially in the case of custom systems				
Other				
Other				
Other				
Security and Privacy Issues				
Threats from hackers and intruders				
Threats from viruses, worms and Trojans				
Unauthorised external and internal access to systems and information				
Lack of security rules, policies and privacy laws				
Inadequate security of government hardware and software infrastructure				
High cost of security applications and solutions				
Lack of risk management security program				
Unsecured physical access to building or computers rooms				
Lack of knowledge for security risks and consequences				
Other				
Other				
IT skills				
Lack of IT training programmes in government				

Shortage of well-trained and qualified IT staff in market				
Developing web site by unskilled staff				
Unqualified project manager				
Lack of employees with integration skills				
Shortage of salaries and benefits in public sector				
No time for training IT employees				
Flow of IT specialist staff				
Other				
Organisational Issues				
Lack of coordination and cooperation between departments				
Lack of effective leadership support and commitment amongst senior public officials				
Unclear vision and management strategy				
Resistance to change from management and employees				
Complexities of existing business processes				
Culture and politics issues				
Other				
Operational Cost				
Insufficient of supply come from central government				
High cost of IT professionals and consultancies				
High cost of hardware and software				
IT cost is high in developing countries				
High cost of installation, operation and maintenance of e-government systems				
High cost of training and system development				
Other				
Other				

Barriers to adoption stage-3 (Two-way Service Delivery)				
	0	1	2	3
ICT infrastructure				
Unreliable networks and communication				
Inadequate network capacity or bandwidth				
Existing systems are incompatible and complex				
No integration across internal systems				
Existing internal systems have restrictions regarding their integrating capabilities				
Unavailability and incompatibility of necessary software, systems and applications				
Integration technologies of heterogeneous databases are confusing				
Lack of documentation especially in the case of custom systems				
Other				
Other				
Other				
Security and Privacy Issues				
Threats from hackers and intruders				
Threats from viruses, worms and Trojans				
Unauthorised external and internal access to systems and information				
Lack of security rules, policies and privacy laws				
Inadequate security of government hardware and software infrastructure				
High cost of security applications and solutions				
Lack of risk management security program				
Unsecured physical access to building or computers rooms				
Lack of knowledge for security risks and consequences				
Other				
Other				
IT skills				
Lack of IT training programmes in government				

Shortage of well-trained and qualified IT staff in market				
Developing web site by unskilled staff				
Unqualified project manager				
Lack of employees with integration skills				
Shortage of salaries and benefits in public sector				
No time for training IT employees				
Flow of IT specialist staff				
Other				
Organisational Issues				
Lack of coordination and cooperation between departments				
Lack of effective leadership support and commitment amongst senior public officials				
Unclear vision and management strategy				
Resistance to change form management and employees				
Complexities of existing business processes				
Culture and politics issues				
Other				
Operational Cost				
Insufficient of supply come from central government				
High cost of IT professionals and consultancies				
High cost of hardware and software				
IT cost is high in developing countries				
High cost of installation, operation and maintenance of e-government systems				
High cost of training and system development				
Other				
Other				

Barriers to adoption stage-4 (Government Integration)

	0	1	2	3
ICT infrastructure				
Unreliable networks and communication				
Inadequate network capacity or bandwidth				
Existing systems are incompatible and complex				
No integration across internal systems				
Existing internal systems have restrictions regarding their integrating capabilities				
Unavailability and incompatibility of necessary software, systems and applications				
Integration technologies of heterogeneous databases are confusing				
Lack of documentation especially in the case of custom systems				
Other				
Other				
Security and Privacy Issues				
Threats from hackers and intruders				
Threats from viruses, worms and Trojans				
Unauthorised external and internal access to systems and information				
Lack of security rules, policies and privacy laws				
Inadequate security of government hardware and software infrastructure				
High cost of security applications and solutions				
Lack of risk management security program				
Unsecured physical access to building or computers rooms				
Lack of knowledge for security risks and consequences				
Other				
Other				
IT skills				
Lack of IT training programmes in government				
Shortage of well-trained and qualified IT staff in market				
Developing web site by unskilled staff				
Unqualified project manager				

Lack of employees with integration skills				
Shortage of salaries and benefits in public sector				
No time for training IT employees				
Flow of IT specialist staff				
Other				
Organisational Issues				
Lack of coordination and cooperation between departments				
Lack of effective leadership support and commitment amongst senior public officials				
Unclear vision and management strategy				
Resistance to change from management and employees				
Complexities of existing business processes				
Culture and politics issues				
Other				
Operational Cost				
Insufficient of supply come from central government				
High cost of IT professionals and consultancies				
High cost of hardware and software				
IT cost is high in developing countries				
High cost of installation, operation and maintenance of e-government systems				
High cost of training and system development				
Other				
Other				

Appendix: C**Description of Interview Agenda**

This appendix describes the purpose behind questions included in the Agenda based into the main sections listed in the Interview Agenda in Appendix B.

Section A	IT/IS Development in organisation
Section B	Organisation Business Process
Section C	The Practice of e-government implementation

Section A**IT/IS Development in organisation**

The aim of section A is to investigate the IT infrastructure of case organisation and identify the applications, technologies and systems that the case organisation uses to support their operations and business processes. This part mainly identify organisational IT capabilities, satisfaction level with existing systems, the reliability of communication and networks infrastructure, and the degree of formalization of systems development and management.

These data will be useful for the researcher to measure the readiness and maturity level of the IT infrastructure in case organisation toward the adoption of e-government, and hence it will help to determine how IT infrastructure might be influence the implementation process of e-government at a certain stage. It will also help to identify the IT factors that prompt or inhabit the adoption of a certain stage.

The following Table describes the purpose behind each question presented in Section A.

Question No.	Description
A.1 and A.2	<p>The importance of these two open-ended questions is to provide a contextual information about IT infrastructure organisation in case organisation which lead to understand the main role of information systems, applications, and other technologies available in organisation. These questions will guide the researcher to investigate the technologies that should be in place before e-government services can be offered reliably and effectively to the public. Hence, recognise the potential of these technologies to support and integrate the operations of information systems and applications across organisations by offering the necessary standards and protocols through network and communication infrastructure approaches (e.g. Intranet, Extranet, and Internet).</p> <p>The answers of these questions in conjunction with A.3 and A.4 will allow the researcher to estimate how complex the existing IT infrastructure and how the information systems might support the adoption process of e-government, and ultimately the influence of IT on e-government implementation.</p>
A3.	As intranet plays an important part in e-government architecture as chapter 2 discussed, it is essential to know how important the intranet in case organisation.
A.4	The potential of e-government will be reduced without permitting the public

	to access to their records via the organisation website. Therefore, this question will investigate as part of IT infrastructure the compatibility of DBMS with Internet-based applications which allow the organisation to provide data and records to public through the website.
A.5, A.6 and A.7	Security is one of the critical issues in IT infrastructure as discussed in chapter 2, especially the degree of risk is escalating as the use of public networks increases together with databases that hold citizens profiles and government information. Therefore, the researcher will investigate through these questions how organisation deal with security issue and which incorporated advanced security approaches and technologies using in organisation such as PKI, reliable firewall, digital signature and certificate that secure government electronic transactions and delivery systems.
A.8	This question will identify how case organisation pay attention to the integration as an important part of IT infrastructure. This question will determine the integration approaches that implemented and how are they supported the e-government project in case organisation.
A.9, A.10 and A.11	In addition to the previous questions, the researcher will ask the interviewee to describe his feeling about the progress of IT infrastructure in his organisation. This will introduce the organisational IT capabilities, satisfaction level with existing systems and the reliability of communication and networks infrastructure. This will allow the researcher to better access the respondents' true feelings on an issue and better understanding the IT factors that might inhabit or promote the adoption of e-government.
A.12 and A.13	These questions can measure the training strategy in organisation and the availability of qualified IT staff. Training strategy is important since it close the skills and knowledge gap in using advance technology that might covering project management, change management, and develop IS and IT skills for using new application and systems for e-government.

Section B**Organisation Business Process**

The aim of this section is to investigate the structure and processes of case organisation that constrain or facilitate the adoption and implementation of e-government, for example, the role to top management in the adoption of e-government, the association of cost with e-government adoption, and benefits that could encourage the case organisation to adopt e-government.

The following table describes the purpose behind each question presented in Section B.

Question No.	Description
B.1	This question will identify the emerging of e-government idea that determine which management level in case organisation has interested and motivated for the adoption of e-government.
B.2	E-government adoption decision typically involves the top management of an organisation; this question considers one of the critical parts in the conceptual framework, which will measure the level of commitment of top management toward the adoption of e-government.
B.3 and B.4	These questions will determine to how extend the influence of cost in e-government implementation process. As question B.3 presented, the researcher will be able to identify the types of cost associate with e-government adoption.
B.5	Public sector organisation may feel pressure to adopt the e-government when it sees more and more organizations in the government adopting the e-government and therefore, feels the need to adopt in order to remain competitive. Therefore, this question will address the validity of this issue and how this feeling will impact the speed of e-government implementation.
B.6 and B.7	These questions will verify how benefits of e-government can influence the adoption of e-government as discussed in chapter 3. In what extend the organisation management and IT mangers understand these benefits to increases the likelihood of the allocation of the managerial, financial, and technological resources necessary to implement e-government and hence speed up the implementation of e-government.

Section C The Practice of E-government Implementation

The aim of this section is to investigate the empirical implementation process of e-government in case organisations. This will lead to introduce the implementation stages that are taking place in case organisation and hence validate the e-government adoption stages that proposed in chapter 3. It will also determine the e-government progress of case organisation, compare the current e-government achievements with the future actions and identify the barriers that might prevent case organisation to proceed toward the next stage of e-government adoption.

Question No.	Description
C.1 and C.2	These questions will determine when and how the first stage of e-government implementation has been placed. The answer of these questions will allow the researcher to determine how much time has been spent to reach to the current stage which estimates the level of complexities till the current stage. It will also identify the nature of first step toward the adoption of e-government and how was this step important to the case organisation.
C.3	This question will identify the contribution level of case organisation IT staff in the process of e-government implementation. This will make clear how much IT employees in case organisation are qualified in IT development and hence in e-government implementation.
C.4	This question will reveal what and how is the future vision of case organisation to the e-government adoption through asking about the availability of strategic plan for e-government adoption. In conjunction with question C.6 these questions will allow the researcher to have clear picture of the case organisation proprieties for next steps toward the adoption of e-government.
C.5	This question will allow the researcher to measure the progress of e-government implementation in case organisation. The researcher will ask the interviewee to describe his feeling about the progress of e-government which help to identify other important factors that would inhabit or promote the implementation of e-government.
C.7	The aim of this question is to identify the current adoption stage that case

	<p>organisation has reached. The researcher will ask the interviewee about the functionalities or key features that incorporated in to the organisation e-government website, and hence the researcher can determine the current adoption stage in case organisation. This will lead to justify the proposed sequence of e-government stages in chapter 3. This information will be validated though the evaluation of case organisation e-government website.</p>
C.8, C.9, C.10, and C.11	<p>These questions will help the researcher to construct a validated stage of growth model for e-government adoption. In doing so, the researcher will ask the interviewee to interpret the practical steps of e-government implementation in his organisation into the adoption stages, and then identify the important of proposed four stages within the practical field of e-government implementation. The answers of these questions will verify the importance of sequence, consistency and complexity of adoption stages and hence validate the proposed framework for e-government adoption.</p>
C.12	<p>This question will identify the barriers for each adoption stage that are experiencing by case organisation. According to the question C.7 that will determine the existing adoption stage for each case organisation, so the researcher will ask interviewee to identify the barriers that his organisation experience to implement the next adoption stage.</p>